Does importance carry weight?

How thinking about the future influences human movement.

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I declare that this report is my own original work and that contribution of others have been duly acknowledged.

Signature: Date:

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Abstract

The present study aimed to determine if thinking about important future events is capable of influencing human movement through the sensation of physical weight. It also considered how this affect interacts with the bilateral deficit. Thirty-four individuals, 13 female, 21 male, with a mean age of 24.6 years, participated in this research. They completed a questionnaire which asked them think about either an important or trivial upcoming, future event. Once completed, measures of manual dexterity, force and reaction time were obtained by Purdue pegboard and pinch grip tasks. In contrast to previous research which has found thinking about current issues or past events creates the physical sensation of weight on the body, there was no evidence to suggest that thinking about important future events influences human movement or the bilateral deficit.

Embodied cognition is founded on the idea that having a physical body influences the way we perceive and interpret the world. This is apparent in the way that we use metaphors. Lakoff and Johnson (1980) proposed that metaphors may represent the way we conceptualise and understand our world. Representing abstract concepts, such as importance, in a way that can be communicated easily can be challenging. Lakoff et al. (1980) proposed that cognition and the way we understand abstract concepts is grounded in our understanding of physical concepts. One example is the conceptual link between weight and importance: we *weigh our options*, consider the *weight of evidence*, attend to things that have *weight*, feel *weighed down*, and *carrying* a *burdensome* secret can be exhausting. These metaphors suggests that we understand importance, an abstract concept, in the same way that we understand weight, a physical concept. Research has found that physical weight influences perceived importance (Ackerman, Novera & Bargh, 2010; Chandler, Reinhard & Schwarz, 2012; Jostmann, Lakens & Schubert, 2009; Kaspar, 2013), whereby, when holding a heavy object, individuals considered items to be of greater importance. However few studies have considered whether perceived importance acts as the physical sensation of weight on the body and how this influences human movement. That is, does importance weigh us down, and does that weight influence the way that we move?

Theory

One theory that has been proposed to explain the association between abstract and physical concepts is scaffolding theory. Scaffolding theory suggests that abstract concepts are mapped onto existing concepts, acting like scaffolding on which the new concept is built (Williams, Huang & Bargh, 2009). This causes the two concepts to be associated with each other, in the same way that semantically related

information is associated (Williams et al. 2009). Because of their common occurrence together, weight and importance become linked, with one activating the other (Ackerman, Novera and Bargh, 2010). More generally, Jostmann, Lakens and Schubert (2009) suggest that because weighty objects require greater mental or physical effort, they have a greater cost to the body than lighter objects. As such, heavy objects become associated with greater importance.

Related Research

This theory is not limited to the association between weight and importance. Numerous metaphors have been identified that may also demonstrate similar associations (Lobel, 2014). For example, research has focused on the association between physical temperature and interpersonal temperature (Williams & Bargh, 2008) and the influence of colour on performance (Elliot & Aarts, 2011).

Williams and Bargh (2008) found that experience of physical warmth was associated with warm personality ratings. Participants were asked to hold a cup of either hot coffee or iced coffee for a research assistant on the way to the experiment. Later participants rated the personality of a fictional person. It was found that those who held the warm coffee rated that person as warmer – more generous, good natured and caring, compared to those who held the iced coffee.

Elliot and Aarts (2011) asked 10th grade students to read aloud their participant number which was written in either red or grey ink. Those who read a red number were found to pinch harder on a pinch grip task than those with grey ink. They also found that undergraduate students squeezed with greater force and velocity when the word squeeze was presented on a computer monitor in red, compared with blue or grey. These findings display the association between the colour red and performance

on motor tasks. These associations are outside of our conscious awareness and yet may be capable of influencing our judgement.

Weight as Importance

The link between weight and importance has recently gained attention in the psychology literature. Jostmann, Lakens and Schubert (2009) gave participants either a light or heavy clipboard on which to estimate the value of foreign currencies. They reasoned that the value of a currency is a strong reflection of its importance as it represents that country's purchasing power. Quite remarkably this small manipulation of weight was effective in altering participants' perceptions of importance. Participants with heavy clipboards rated currencies as more valuable, than participants with lighter clipboards. This demonstrates that greater weight is associated with greater importance. In a similar experiment, Jostmann et al. asked participants to rate the importance of having a voice in a decision making process. They found that participants with a heavy clipboard considered having a voice to be more important than those with a light clipboard. Could it be possible that incidental interactions with random objects influence our perceptual judgements? The idea that something so subtle could influence our judgements may come as a surprise to many, but the evidences appears to support this idea.

Furthering this area of inquiry, Ackerman, Novera and Bargh (2010) found that when passers-by evaluated a resume on a heavy clipboard they considered the job-candidate to be more important than those who held a light clipboard. This surprising finding didn't stop there; passers-by holding the heavy clipboard also felt that their own accuracy on the task was more important and that the job candidate had a more serious interest in the position (Ackerman et al. 2010). However, they did not expect the job candidate to be better at getting along with their co-workers. This suggests

that not only should we be adding lead weights to our resumes, but that manipulating weight affects perceived importance across a number of related domains, without extending outside the metaphorical link to other abstract concepts such as social ability.

Ackerman et al. (2010) also asked passers-by to complete a "social action survey" on either a light or heavy clipboard. It was found that men allocated more money to social issues in the heavy condition then the light condition, while women allocated the maximum amount of funding for both heavy and light conditions. Could this mean that sex differences exist in the influence of this effect, or are women are just more generous towards social issues than men? This issue is outside the scope of this research, but is still worthy of consideration and the attention of future research. Ackerman et al. (2010) concludes that these findings suggest there is a conceptually specific link between weight and importance.

The influence of a weighted clipboard does not end there; it has been found that a heavy clipboard can increase participants' ratings of perceived disease severity (Kaspar, 2013). Severe or life threating diseases are of greater concern to society and so Kaspar (2013) infers that they are of greater importance. Kaspar (2013) found that participants with a heavy clipboard rated diseases as more severe, suggesting they were more important, but did not differ from those with lighter clipboards on perceived recovery time. This is consistent with the idea that the metaphorical link between weight and importance is responsible for this effect.

Expanding beyond clipboard weight manipulation, Chandler, Reinhard and Schwarz (2012) found that participants who held a heavier version of the same book rated it as more important than its lighter twin. This was even the case when participants had

some knowledge about the books' contents, with some participants having read part or all of the book. Chandler et al. (2012) suggested that this was the case because of the activation that resulted from the metaphorically associated semantic knowledge shared between weight and importance. Holding a heavy book creates feelings of importance which, even with associated knowledge, can affect judgements about importance. Somehow this association between weight and importance overrides or modifies our logical evaluations to affect our judgements. Considered together, these findings demonstrate that incidental interactions are capable of influencing perceptions of importance. It is clear this relationship is complex, but it is not clear how this effect operates.

Importance as Weight

While researchers have documented that physical weight can lead to greater perceived importance, few have considered whether this relationship is bidirectional (Jostmann, Lakens & Schubert, 2009). That is, does perceived importance influence the perception of physical weight. Is importance weighing us down?

A study conducted by Schneider, Rutjens, Jostmann and Lakens (2011) found that when participants were told a book was important they estimated its weight as greater than participants who were unaware of the book's importance. It seems that heavy books alter judgements of importance (Chandler, Reinhard &Schwarz, 2012), and thinking a book is important alters our perception of its weight (Schneider et al., 2011). This suggests that physical weight can influence perceived importance, and perceived importance can influence the perception of weight. If this association is applied to our everyday life it could have a number of implications. Individuals who feel that their fitness is important might feel like weights at the gym are heavier than those who are comfortable with their level of fitness. Students who carry major

assignments or expensive laptops home from school may feel that their backpack weighs more than those carrying minor assignments or older, second-hand laptops. If this is the case, then how does this influence human movement?

Carrying a heavy backpack or weighty object not only creates the sensation of weight but increases the effort required to move. With this being the case, some researchers wondered if big or important secrets, often said to be a *burden* on the individual, act in a similar way. Slepian, Masicampo, Toosi and Ambady (2012) observed that individuals carrying an important secret acted as if they were carrying a physical burden. For example, participants who recalled a meaningful, personal secret, compared to a small secret, estimated hills shown in photographs to be steeper (Slepian et al., 2012). This is consistent with individuals carrying a physical burden who perceive greater effort to be required to overcome a hill and so estimate greater steepness (Proffitt, Stefanucci, Banton & Epstein, 2003). Further, Slepian et al. (2012) asked undergraduates to throw a bean bag into a container 2.65m away. It was found that those with a meaningful secret tended to overthrow the bean-bag. Slepian et al. (2012) suggested that those with an important secret estimated the distance to be further away, exerting greater force than required when attempting to throw the bean-bag into the container. The need to exert greater force is consistent with what could be expected if they were actually weighed down or carrying a physical burden requiring greater effort. These findings indicate that not only does importance act as the physical sensation of weight on the body, but it is also capable of influencing our judgments, and this in turn is capable of influencing our behaviour. The expectation that greater effort will be required, as a result of the 'weight of importance', extends beyond mere feelings, to influence cognitive processes (judgements) and then action (behaviour).

Slepian, Masicampo, Toosi and Ambady (2012) also noted that importance only affected physical tasks. Individuals who had committed an infidelity perceived greater effort for physical tasks than non-physical tasks (Slepian et al., 2012). Similarly, gay men concealing their sexuality, something of considerable importance to them, were less willing to assist with a physical task than gay men concealing their extraversion, something fairly trivial (Slepian et al. 2012). Interestingly, there was no difference between the two groups on non-physical tasks, indicating that greater importance only influences perceptions of weight-related effort (Slepian et al., 2012). Consistent with the metaphorical association between weight and importance as the cause of this effect, this again demonstrates that the importance of an event or issue can influence perceived effort and thus behaviour through the physical sensation of weight.

These findings were supported by Day and Bobocel (2013) who asked participants to recall either an ethical or unethical memory before recording the amount of perceived effort for behaviours. It was found that individuals perceived greater effort for physical than non-physical tasks when recalling an unethical memory (Day et al., 2013). They acknowledged that more frequent thoughts or recollection of secrets could result in greater perceived effort. This is consistent with previous findings and demonstrates that other factors may affect the strength of this relationship. The more important a memory, the more frequently it is likely to be recalled. This being the case, more frequent recollection could be associated with greater weight or importance.

In summary, the metaphorical association between weight and importance has been established in the literature (Ackerman, Novera & Bargh, 2010; Chandler, Reinhard & Schwarz, 2012; Day & Bobocel, 2013; Jostmann, Lakens & Schubert, 2009;

Kaspar, 2013; Slepian, Masicampo, Toosi & Ambady, 2012; Schneider, Rutjens, Jostmann & Lakens 2011). Research considering this association has focused largely on weight influencing perceived importance, without considering more broadly the influence of importance on the perception of weight. Those that have done so largely considered secrets or unethical memories which may represent the embodiment of guilt, and not importance (Day & Bobocel, 2013; Slepian, Masicampo, Toosi & Ambady, 2012). Guilt is often said to be carried, and while it may contain an element of importance, guilt may represent a different concept. Accordingly, research could be extended or applied to a number of guilt related issues such as lying or being dishonest, but it does not demonstrate whether the importance of this issue is responsible for the effect. Numerous important events or issues exist that could weigh individuals down, but aren't commonly associated with feelings of guilt. For example, buying a house could be a *burdensome* life event, but not because of feelings of guilt.

Previous research is also limited, in that it only considers past events (such as unethical memories) and current issues (such as secrets, or the estimated weight of a book at one point in time) in its manipulation of importance. Future events are also important and so have the potential to weigh individuals down. In this case the weight of importance may not only influence their present state, but also the outcome of the future event. For example, a student whose approaching assignment is weighing them down may underperform on that assignment as a result of the weight of its importance.

Little research has considered how the sensation of weight influences human movement. While it has been shown that importance can affect judgements which may alter behaviour, whether this additional weight actually affects the body's

movement has not been considered. That is, does the perceived additional weight directly influence movement or only our perceptions of weight? With this in mind, the current study aimed to address a number of limitations within the literature.

The current study

The purpose of this study was to provide further evidence for the bidirectional relationship between weight and importance. Its goal was to determine whether thinking about important events can influence human movement, based on the assumption that important events implicitly evoke the sensation of physical weight. It also aimed to consider whether this effect would take place when thinking about future events, rather than past events or current issues. It was also designed to explore how the association between weight and importance influences or interacts with the bilateral deficit.

Previous research considering how importance influences weight has largely addressed how the physical sensation of weight influences the mental processes that alter judgements of the perceived effort for physical tasks (Day & Bobocel, 2013; Schneider, Rutjens, Jostmann & Lakens, 2011; Slepian, Masicampo, Toosi & Ambady, 2012). Physically carrying a heavy object can make individuals feel tired or result in muscle fatigue (Place, Yamada, Bruton & Westerblad, 2010). This in turn could result in slower, less coordinated movements or a degree of unwillingness to move. Given those who describe feeling weighed down by importance tend to exhibit some of the same characteristics, it is possible that the sensation of physical weight also affects movement. The current research aimed to determine how thinking about important events affects human movement in terms of force production and manual dexterity or the precision of movements.

In manipulating importance, previous research has largely considered unethical memories (Day & Bobocel, 2012), or secrets (Slepian, Masicampo, Toosi & Ambady, 2012). Not only may their findings represent the weight of importance as an element of guilt, but they focus on current issues or past events. Even Schneider, Rutjens, Jostmann and Lakens', (2011) study, in which participants were asked to estimate the weight of books, was focused on the present, and for those who did not read the whole book, it may have an element of guilt involved. In contrast, this study has focused on future events. It aimed to determine whether the weight-importance relationship would influence important future events more broadly, which are often considered to be more important as they approach, but less important in hindsight.

The bilateral deficit is a phenomenon in which simultaneous bilateral movements result in the deterioration of performance in each limb (Ohtsuki, 2013). That is, the movement of one hand is not as fast, or as forceful when both hands are moved, compared to the movement of a single hand. For example, weightlifters can lift more with two arms than one, but this is usually not twice as much as a single arm. This effect has been found to influence movement strength (Li, Danion, Latash, Li & Zatsiorsky, 2000; Ohtsuki, 1981; Ohtsuki, 1983), speed (Dickin & Too, 2006) and reaction time (Taniguchi, Burle, Vidal & Bonnet, 2001). One possible explanation for this effect is interhemispheric inhibition (Garry & Franks, 2000; Taniguchi et al. 2001). That is, that the deficit results from the inhibition of one side of the brain to the other (Garry et al., 2000; Taniguchi et al., 2001). For example, when movement in one arm is initiated, movement in the other arm is inhibited. Interhemispheric inhibition suggests that when both arms are moved, both hemispheres inhibit each other, resulting in the inhibition of both arms, known as a bilateral deficit.

To date no research has considered if the bilateral deficit is influenced by the weight-importance relationship. Given that little is known about the weight-importance relationship per se, the extra effort required for physical tasks may result from the influence of importance on the inhibitory system. Increasing inhibition would result in decreased force and movement speed. If this were the case, than an even greater inhibition would also be expected for individuals undertaking bilateral movement tasks while thinking about important events. This study aimed to consider whether these effects interact to influence human movement, in the hope of gaining further understanding about the mechanisms responsible.

Hypotheses

With this in mind, it was hypothesised that thinking about important events would result in decreased physical performance, evident by decreased force production, and manual dexterity. It was also predicted that, as future events can also be considered important, thinking about important future events would result in the physical sensation of weight on the body and that this would be evident through the decline in physical performance. It was hypothesised that the bilateral deficit would interact with the weight-importance relationship – whereby there would be a greater deficit when thinking about important future events, than when thinking about trivial future events.

Method

Participants

Thirty-four individuals, 21 male and 13 female, participated in this study. The mean age was 24.6 years with an age range of 19 to 33 years. Two participants were identified as left-handed, the remainder right-handed. Participants were free from known neurological disorders, clinically diagnosed anxiety, depression or post-

traumatic stress disorder. Participants were required to be between 18 to 45 years of age and participated for course credit or the chance to win one of two $50 Coles/Myer gift vouchers. Recruitment occurred on campus through advertisements on bulletin boards and by researchers. The experiment was given approval by the Human Research Ethics Committee (Tasmania) Network. Ethics reference: H0014923 (Appendix A).

Apparatus

Purdue Pegboard. A Purdue Pegboard was used to measure manual dexterity. This apparatus consisted of a wooden board with two columns of holes down the centre. At the top of the board were two wells filled with small-diameter steel pegs. The aim of this task was for participants to place as many pegs with one or both hands in the consecutive holes as possible within 30 seconds. Each hand was allowed to collect one peg at time and one hand could not help the other to place a peg. Participants completed the task in a unimanual condition in which they used one hand at a time, and in a bimanual condition, in which they used both hands.

Force transducer. Two force transducers were used to measure reaction time, strength (force) and rise time (rate of force increase) on a pinch grip task. Participants pinched with their thumb and index finger in response to a visual stimulus. On each trial, a black fixation cross on a white background was presented in the centre of a 19-inch computer monitor positioned approximately 60cm directly in front of the participant. After a variable foreperiod, this was replaced by the word "SQUEEZE", which was the cue to respond. The stimulus was presented in the centre of the screen in upper case, black 72 point font and remained on the screen for four seconds. Participants were instructed to squeeze the force transducer between their thumb and index finger, with one or both hands, as hard as they could, and hold

for as long as “SQUEEZE” appeared on the screen (four seconds). There were a total of 10 trials in each condition, separated by a random interval of 8-10 seconds. The THA-100-Q force transducers had 26mm diameter and 15mm thickness (including two Perspex discs for participant comfort).

Questionnaire. A questionnaire was used to prompt participants in thinking about either an important or trivial future event (Appendix A). The important events questionnaire asked participants to think about an upcoming important or notable event; something that involved considerable planning and preparation or that was likely to produce a lasting memory (Alban & Kelley, 2013). Examples included a major assignment or exam, graduation, getting engaged or married, having a child, buying a new car or taking up a new job. In contrast, participants in the trivial events group were asked to think about an upcoming event that was a routine, trivial, daily activity, something done with very little planning or preparation that wouldn’t be expected to produce a lasting memory. Examples included getting ready for bed, making supper or walking to work or class.

The remainder of the questionnaire was the same for both trivial and important groups. The questionnaire asked them to think about when and where the event would take place, who would be involved, what would be happening and how it would make them feel. It asked them to indicate the nature of the event by marking the appropriate categories; relationship, family, study, work, health, moral, financial, lifestyle or other. Visual analogue scales were used to measure seven items relating to the future event: the perceived importance (not very important; very important), personal relevance of the event (not very relevant; very relevant), the expected timeframe of the event (in the next few days; more than six months away), the frequency with which the event comes to mind (almost never; very often), the clarity

with which the event comes to mind (very unclear; very clear), whether the event was positive or negative (very positive; very negative) or whether the participant's reaction to the event was positive or negative (very positive; very negative). Participants were asked to mark a vertical line to indicate where they felt they fit on the scale.

Edinburgh Handedness Inventory. A revised Edinburgh Handedness inventory was used to obtain basic demographic information and the handedness of participants (Appendix A). It asked them to indicate their sex and date of birth, along with their preferred hand for activities including writing, drawing, throwing, scissors, toothbrush, knife (without fork), spoon, broom (upper hand), striking a match (match hand) and opening a box (lid).

Procedure

Participants were invited to participant in a study looking at how thinking about the future influences human movement. Those who responded and met the criteria for inclusion in the study (see Participants section) participated in a single session lasting 30 to 60 minutes.

To begin with participants were introduced to the study, its procedures and what they were being asked on to complete. This included reading the information sheet and consent form. Once informed consent was given, participants were asked to complete the revised Edinburgh Handedness Inventory and were randomly allocated to either the Trivial or Important group. There was an equal number of participants in the control condition, trivial event, and in the experimental condition, important event.

Participants then completed the questionnaire which asked them to consider either an important or trivial upcoming event. Once the questionnaire had been completed, participants performed the Purdue Pegboard and pinch grip task (the order of which was counterbalanced).

For the pegboard task, participants placed their hands palm down on either side of the board. They were informed that, when the experimenter said 'Go', their aim was to place as many pegs in the board as possible in 30 seconds, until the researcher said 'Stop' and that pegs should be placed progressively down the column in consecutive holes. Participants completed three trials with their left hand, three with their right hand and three with both hands. For the trials using both hands, participants were informed that they should move simultaneously, with both hands picking one peg each and the placing both pegs in the holes independently, before returning to the basket for the next pegs. If a peg was dropped or bounced out of the hole it was not counted and participants were instructed to leave it and continue with the task. In instances where these instructions were not followed, participants were reminded and the number of improperly placed pegs was deducted if necessary. For example, if a participants picked up three pegs and placed them in the holes one at a time, only one peg would be counted towards their final score. The order in which conditions (left, right or bimanual) were conducted was randomised, with participants completing all three trials of one condition before moving to the next condition.

For the pinch grip task, participants held the force transducer between their thumb and index finger. Participants were warned to avoid the temptation to use multiple fingers on the top of the transducer. At the beginning of the task participants performed a maximal voluntary contraction (MVC) task to obtain a baseline measure of strength. The researcher asked the participant to squeeze the force transducer as

hard as possible, holding it until they were indicated to stop by the experimenter, approximately four seconds. They completed three practice trials with their left, three with their right and three with both hands. Then participants were instructed to look at the fixation point on the computer monitor. When the participant was ready the experimenter started the computer program. The participant was informed to pinch the force transducer *as hard as they can* when the stimulus word (SQUEEZE) appeared on the screen, and to maintain the maximum force until the stimulus was removed (four seconds). A total of ten trials was completed for each of the three conditions. After the tenth trial the word "FINISHED!" was displayed on the monitor and participants were offered a break to minimise fatigue. Breaks of 60 seconds have been found to decrease the decline in grip strength over 5 trials in young adults (Trossman & Li, 1989). There was short delay in preparing for each condition, so even participants who did not desire a break had a short rest of about 30 seconds. All breaks were concluded within a few minutes, when participants felt they were ready to continue.

Once both tasks were complete, participants were thanked for their participation and debriefed. They were then offered the opportunity to withdraw from the study and ask questions about the research.

Design

This was a between groups design, for which the independent variable (IV) was group (Important or Trivial). For the pegboard task IVs also included condition (dominant, non-dominant or bimanual) and trial (one, two, three), while for the pinch grip task the IVs were hand (dominant or non-dominant), condition (unimanual or bimanual) and trial (1-10). The dependent variable for the pegboard task was precision, measured by the number of pegs placed in each 30 second trial. The

dependent variables for the force task were force production (measured in arbitrary units, a.u.), reaction time (s) and rise time (s). Force production was calculated as the difference between the minimum force (baseline) and the maximum force achieved in a trial. Reaction time (RT) was defined as the point where the rate of change in force reached 5% of the steepest change in force in the first second following stimulus presentation. Rise time was determined by locating the first plateau in force following RT and calculating the time difference between that point and RT. The dependent variables measured from the questionnaire included the nature of the event, for which the following categories were available: *relationship*, *family*, *study*, *work*, *health*, *moral*, *financial*, *lifestyle* or *other.* Participants could select more than one category. Other dependent variables measured from the questionnaire include importance, personal relevance, distance in the future, frequency, clarity, nature (positive or negative) and feelings towards the event (positive or negative). These were measured on a visual analogue scale with anchor points ranging from 0cm – 10.5cm.

Data analysis

A multilevel linear model was used to analyse the data. The analyses were conducted using SPSS version 21. For the pinch grip task the repeated measures were trial, condition (unimanual, bimanual) and hand (dominant, non-dominant), or condition (dominant, non-dominant or bimanual) for the pegboard task. All variables were entered as fixed variables. *P*-values were considered statistically significant when $p < .05$. Statistical significance was tested using multiple comparisons tests, Fisher's least significant difference (LSD), used to compare differences between groups. Data was missing for one participant for the force production task, as a result of technical difficulties. In addition, independent samples *t* tests were used to compare the

differences between Trivial and Important groups on questionnaire items. The magnitude of the effect was also calculated, with a Hedge's g of 0.2-0.5 considered small, 0.5-0.8 considered moderate and greater than 0.8 considered large.

Results

Questionnaire

Work, *health* and *lifestyle* were the most commonly thought about events, followed by *relationships*, *family* and *financial* events. Few individuals thought about events relating to *study*. No individual thought about *moral* events and only one individual considered their event to relate to a category *other* than those listed (Figure 1).

Both groups considered their events to be reasonably important, with trivial events (M = 6.35cm, SD = 3.10) considered less important than important events (M = 8.00cm, SD = 1.72). This difference was of moderate magnitude, but not statistically significant, $t(25) = 1.91$, $p = .067$, $g = 0.66$. The mean level of relevance for the trivial group (8.15cm, SD = 2.21) was not significantly different from that of the important group (8.82cm, SD = 2.43), $t(31.71) = 0.84$, $p = .406$, $g = 0.29$, indicating that both groups felt their events were personally relevant. With regards to time frame, trivial events (M = 1.07cm, SD = 1.99) were considered nearer in the future than important events (M = 6.81cm, SD = 4.14). This difference was statistically significant with a large magnitude, $t(22.99) = 5.15$, $p < .001$, $g = 1.77$. This may reflect the routine nature of trivial events and the more uncommon nature of important events. The mean frequency for trivial events was 6.79cm (SD = 2.73) compared with 6.31cm (SD = 2.40). This difference was not statistically significant, $t(32) = -0.55$, $p = .590$, $g = 0.19$. The mean clarity with which the event came to

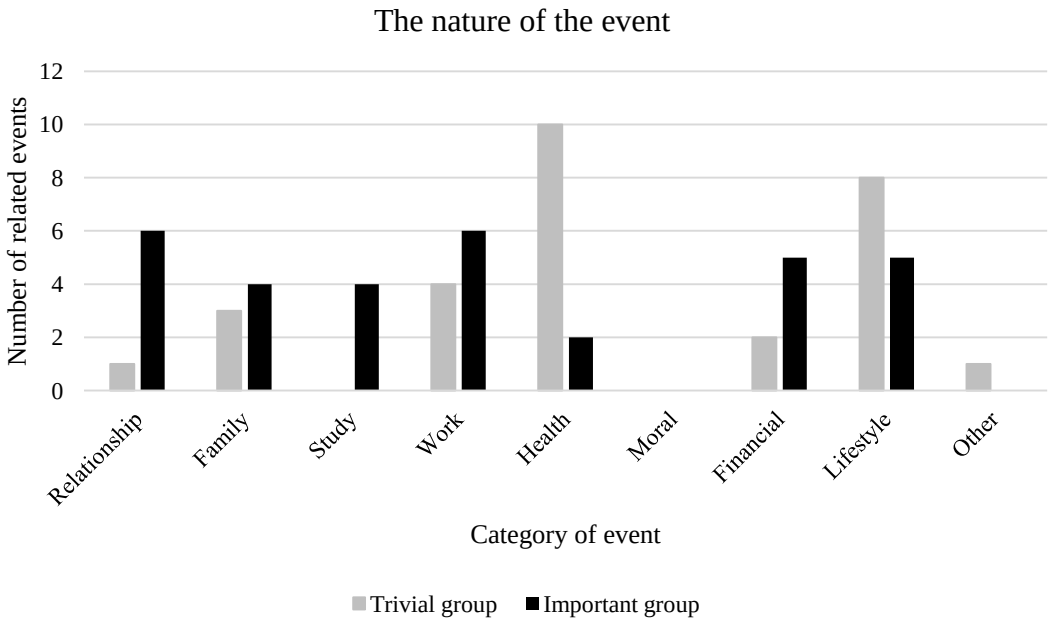

Figure 1: The number of participants whose event related to each category for the Trivial and Important groups.

mind was 8.77cm (*SD* = 1.77) for the trivial group and 6.78cm (*SD* = 2.67) for the important group. This was a large magnitude, statistically significant difference, $t(32) = -2.56$, $p = .015$, $g = 0.88$. This indicates that participants recalled trivial events with greater clarity than that of important events, again this may reflect trivial events' routine nature. Both trivial (*M* = 3.22cm, *SD* = 3.05) and important groups (*M* = 3.09cm, *SD* = 2.62) thought about reasonably positive events, with no significant differences between groups, $t(32) = -0.13$, $p = .898$, $g = 0.05$. Participants' reaction to events was slightly more positive for trivial events (*M* = 2.68cm, *SD* = 2.65) than important events (*M* = 3.84cm, *SD* = 2.46). Although the difference between groups was not statistically significant, $t(32) = 1.33$, $p = .194$, $g = 0.45$.

Pegboard

The mean number of pegs placed by the trivial group (*M* = 14.99, 95% CI[14.43,15.55]) was not significantly different overall from the number of pegs placed by the important group (*M* = 14.56, 95% CI[14.00,15.12]), *F*(1,32) = 1.23, p =.277.

There was a significant effect of condition (Figure 2), *F*(2,256) = 271.75, *p* < .001, where bimanual movements (*M* = 12.60, 95% CI[12.16,13.04]) placed significantly fewer pegs than both the non-dominant hand (*M* = 15.06, 95% CI[14.62,15.50]), and the dominant hand (*M* = 16.70, 95% CI[16.23,17.11]), consistent with the bilateral deficit. The number of pegs placed by the non-dominant hand was also significantly lower than that of the dominant hand (Table C4, Appendix C).

There was a significant effect of trial, *F*(2,256) = 18.23, *p* < .001. A pairwise comparison (Table C6, Appendix C) revealed participants placed fewer pegs in the first trial (*M* = 14.21, 95% CI[13.77,14.65]) than in the second trial (*M* = 14.85, 95% CI[14.41,15.29]), and a greater number still in the third trial (*M* = 15.27, 95% CI [14.82,15.71]) (Figure 3). This is consistent with the learning effects that were expected for this task.

There was no significant interaction between group and condition, *F*(2,256) = .62, *p* = .538 (Table C7, Appendix C), nor were there significant interactions between group and trial, *F*(2,256) = 0.84, *p* = .432 (Table C8, Appendix C), condition and trial, *F*(4,256) = 0.13, *p* = .970 (Table C9, Appendix C), or group, condition and trial, *F*(4,256) = 0.22, *p* = .928 (Table C7, Appendix C). This suggests that thinking about future events had little effect on movement precision.

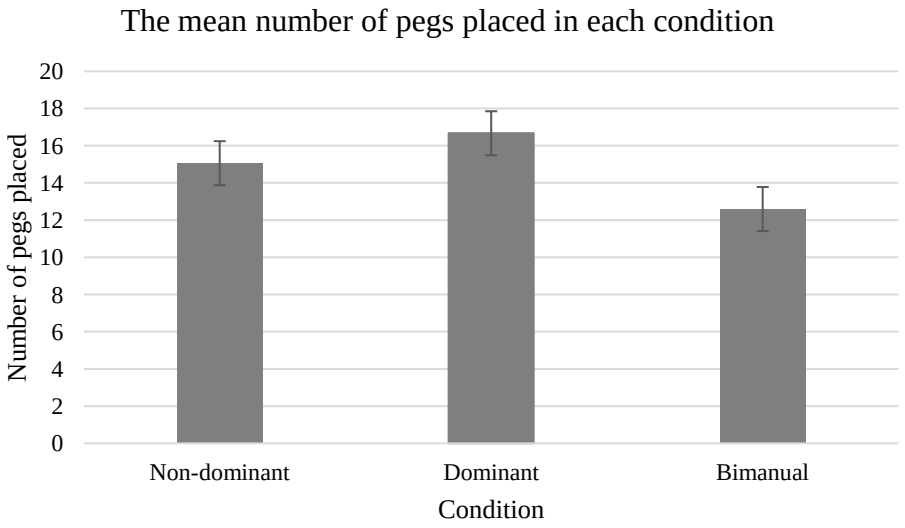

Figure 2: The mean number of pegs placed was greatest for the unimanual conditions (non-dominant and dominant) and less for the bimanual condition.

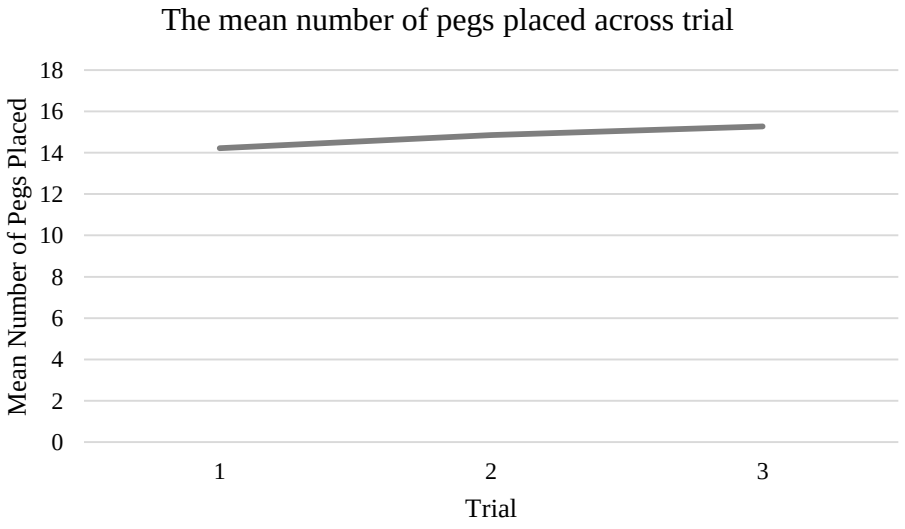

Figure 3: Overall, the mean number of pegs placed increased across trial.

Force tasks

Group. There was no significant effect of group for force production $F(1,31.03) = 1.86$, $p = .183$, reaction time, $F(1,31.05) = 0.98$, $p = .331$ or rise time, $F(1,31.00) = 0.49$, $p = .490$ whereby there was no significant difference between Important and Trivial groups in force production (trivial $M = 0.25$a.u., 95% CI[0.22,0.29],

important *M* = 0.28a.u. 95% CI[0.25,0.32]), reaction time (trivial *M* = 0.21s, 95% CI[0.19,0.23], important *M* = 0.20s, 95% CI[0.18,0.22]) and rise time (trivial *M* = 0.33a., 95% CI[0.30,0.35], important *M* = 0.32a.u, 95% CI[0.29,0.34]).

Condition. No significant effects of condition were found for force production, $F(1,1176.43) = 1.62$, $p = .204$, reaction time $F(1,1176.34) = 1.38$, $p = .240$ or rise time, $F(1,1176.27) = 2.59$, $p = .108$. That is, the mean maximum force for the unimanual condition (*M* = 0.27s, 95% CI[0.25,0.29]) was not significantly greater than that the bimanual condition (*M* = 0.27s 95% CI[0.24,0.29]) (Table D3, Appendix D). Nor was unimanual reaction time (*M* = 0.21, 95% CI[0.19,0.22]) greater than bimanual reaction time (*M* = 0.21, 95% CI[0.19,0.22]) Table E3, Appendix E) or unimanual rise time (*M* = 0.32, 95% *CI*[0.30,0.34]) greater than bimanual rise time (*M* = 0.33 95%, *CI*[0.31,0.34]) (Table F3, Appendix F). These results do not demonstrate a bilateral deficit in force production, reaction time or rise time (speed).

Hand. There was a significant effect of hand for force production, $F(1,1176.37) = 4.72$, $p = .030$, whereby the mean maximum force for the dominant hand (0.27a.u., 95% CI[0.25,0.30]) was significantly greater than that of the non-dominant hand (0.26a.u., 95% CI[0.24,0.29]). This suggests that the dominant hand, which was the right hand in all but two cases, was stronger than the non-dominant hand. There was no significant effect of hand for reaction time, $F(1,1176.16) = 0.06$, $p = .939$ (Table E4, Appendix E), or rise time $F(1,1176.03) = .62$, $p = .430$ (Table F4, Appendix F).

Trial. There was significant effect of trial for force production, $F(9,1176.42) = 25.6$, $p < .001$, whereby the mean maximum force generally decreases (Figure 4). The

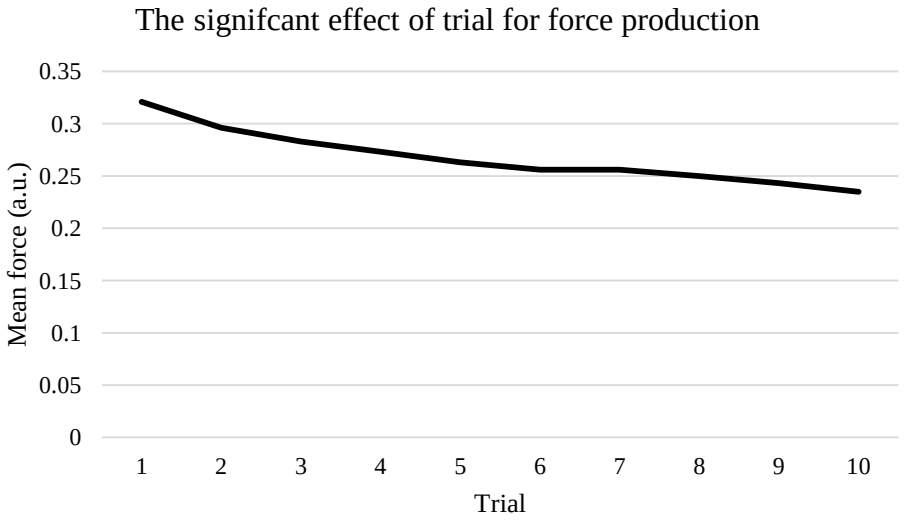

Figure 4: Force production decreased across trial, consistent with fatigue effects.

effect of trial was also significant for reaction time, $F(9,1176.34) = 6.22$, $p < .001$. In general, reaction time decreased greatly after trials one and two then remained stable (Figure 5). However, there was no significant effect of trial for rise time, $F(9,1176.25) = 0.39$, $p = .941$ (Table F5 and F6, Appendix F).

Group and condition. There was no significant interaction between group and condition for force production, $F(1,1176.43) = 1.46$, $p = .227$ (Table D7, Appendix D), reaction time, $F(1,1176.34) = 2.21$, $p = .137$ (Table E7, Appendix E), or rise time, $F(1,1176.23) = 0.65$, $p = .419$ (Table F7, Appendix F). This indicates that thinking about future events does not increase the bilateral deficit in the pinch grip task.

Additional Interactions. There was a significant interaction between group and hand for force production $F(1,1176.37) = 32.06$, $p < .001$; where a greater difference existed between groups for the non-dominant hand than the dominant hand (Figure 6; Table D8, Appendix D).

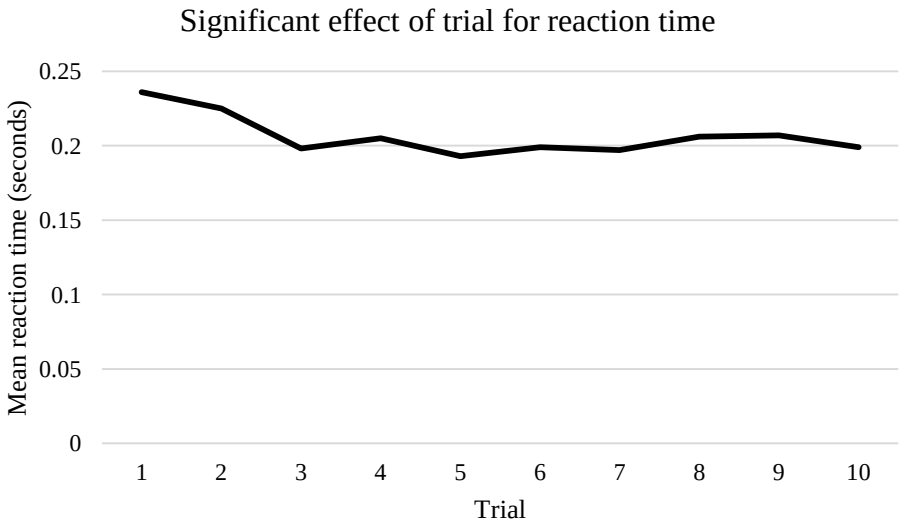

Figure 5: Reaction time tended to increase in the beginning trials before stabilising.

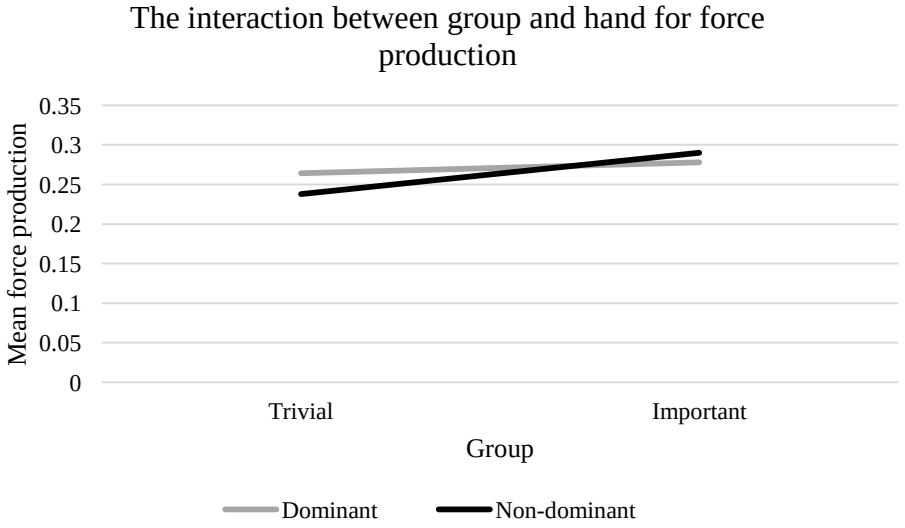

Figure 6: The non-dominant hand produced greater force for in the important condition than the trivial condition, while the dominant hand produced only a small increase in force in the important condition.

There was a significant interaction between condition and hand for rise time, $F(1,1176.03) = 8.87$, $p = .003$, (Figure 7; Table F10, Appendix F). The dominant hand took longer to reach maximum force in bilateral condition compared with the

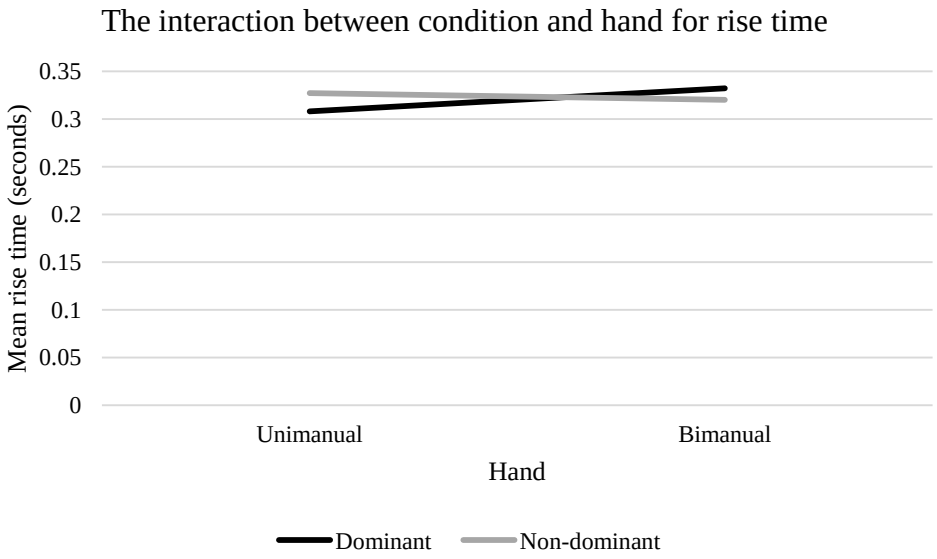

Figure 7: The dominant hand had an increase in rise time in the bimanual condition when compared to the unimanual condition, whereas the non-dominant hand had a decrease in rise time from unimanual to bimanual.

unilateral condition. While the non-dominant hand took less time to reach maximum force in the bilateral condition than the unilateral condition.

The interaction between group and trial for rise time almost reached significance, $F(19,1176.25)=1.88$, $p= .051$ (Figure 8; Table F9, Appendix F). No other interactions were significant (Table D1, Table E1 and Table F1, Appendix).

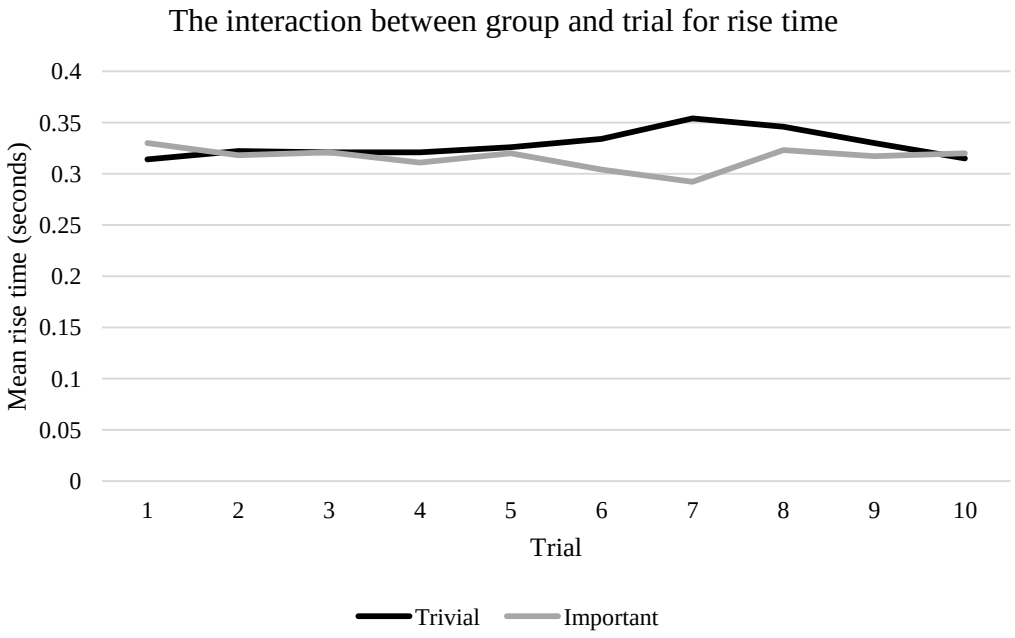

Figure 8: Participants in the trivial group tended to increase before declining, while those in the important group decreased before returning to their previous level.

Discussion

Based on previous research on the effects of keeping important secrets on physical performance (Slepian, Masicampo, Toosi & Ambady, 2012), it was hypothesised that thinking about important future events would result in reduced performance on dexterity and strength tasks when compared with thinking about trivial future events. It was also predicted that this effect would increase the bilateral deficit. The findings from this study did not support these hypotheses.

With the exception of force production, thinking of important future events had little effect on performance. No significant differences existed between Trivial and Important groups across pegboard, force production, reaction time and rise time. These findings indicate that thinking about important future events has little effect on human movement. However, a significant interaction between group and hand for force production, suggests that the non-dominant hand exhibited an increase in

strength in the Important group. In addition, there was no significant interaction between group and condition suggesting that thinking about important events has no effect on bimanual movements. These may suggest that any influence of the weight-importance relationship is not as result of similar inhibition processes suspected of causing the bilateral deficit.

There was a significant effect of condition for the pegboard task; participants' scores on the bilateral condition were not equal to that of the sum of their unimanual conditions. This suggests that participants had less precision in the bimanual condition and consistent a bilateral deficit. There was little difference between unimanual and bimanual conditions across force production, reaction time and rise time which was not consistent with a bilateral deficit. It suggests that participants were not more forceful or faster in responding with a single hand. However, there was a significant interaction between condition and hand for rise time, where the non-dominant hand had a greater rise time than the dominant hand in the unimanual condition. However, in the bimanual condition, the non-dominant hand was faster than the dominant hand. Garry and Franks (2000) found that reaction time increased for bilateral elbow flexion movements only when participants were asked to make precise movements with their left arm. When participants focused on making precise movements with their right hand during bilateral movements, there was no difference between unilateral and bilateral movements (Garry et al, 2000). As the pegboard task required precision it is possible that participants focused on their non-dominant hand, resulting in the evident bilateral deficit. In contrast, for the pinch grip tasks, participants were not required to make precise movements, so were likely to be focusing on their dominant hand. This suggests that differences in task requirements and attention that affect the bilateral deficit have also influenced these findings.

An increase in the number of pegs placed across trials for the pegboard task was found. This was consistent with the learning effects expected for this task, whereby participants were expected to improve on the task as they became more familiar with it. The effects of trial for force production was consistent with the fatigue effects expected, whereby participants tended to exert less force with each trial as they grew tired. A decrease in reaction time in across the first three trials was consistent with a learning effect for the pinch grip task. Once participants became familiar with the pinch grip task, reaction time remained fairly stable. In addition, the dominant hand was stronger than the non-dominant hand, but did not display significantly faster reaction time or rise time. This was expected as the dominant hand, which for most participants was their right hand, is usually stronger than the non-dominant hand, but does not react more quickly in such a simple movement task.

A number of possible inferences could be drawn from these findings. Firstly, future events may not create the physical sensation of weight on the body, or do so with the same strength, as current issues or past events. To date, previous research has only considered current issues or past events in terms of manipulating importance. The present study considered only future events and while it was expected that future events would provide a potent level of importance, there does not appear to be as many weight-importance metaphors that directly relate to future events. As a result, these findings may demonstrate that future importance has little or no effect on the physical sensation of weight.

Alternatively, the effect of importance on the sensation of weight may not translate into human movement in terms of force production, reaction time, rise time or the precision of fine motor movements. This study limited its scope to considering only these elements of human movement. It is possible that other movements or areas of

the body are subject to greater weight. After all, Atlas carried the weight of the world on his shoulders, not in this hands. Future research could consider testing other movements, such as those involving shoulder, leg, core or different muscle groups, to determine if they are influenced by the weight of importance. It may also be the case that any effect on human movement is more subtle than this study was capable of detecting. Further still, while human movement may not be influenced by the weight of importance, human behaviour potentially could be. Slepian Masicampo, Toosi and Ambady (2012) have demonstrated that the perception of weight influences participant's willingness to undertake a physical task. This relationship may not inhibit movement directly, though it may still influence movement through behaviour and perception. The findings from this study would then suggest that the influence of importance on weight remains perceptual. That is, despite feeling weighed down, there is no or little effect of importance on human movement. However, the perception of weight may still affect the way, or whether, individuals undertake movement. For example, if may not slow their movements at the gym, but it may influence whether they go to the gym. The possibilities for future research here are extensive in determining which, if any, movements are effected and how the weight-importance relationship influences the initiation of behaviour.

A third alternative is that the strength of the relationship between weight and importance is less than previous research would suggest. This is consistent with findings from Rabelo, Keller, Pilati and Wicherts (2015), who suggests that a publication bias might exist within the literature, whereby those articles that find a big effect from a small manipulations are published, but not those who find little of no effect. In this case, these findings may demonstrate that the weight and importance relationship is more subtle than previous literature has reported, whereby

the influence of weight on importance has little measurable effect. This would further limit the ability of this study to detect its effect on human movement.

Finally, a fourth alternative is that this study was not powerful or methodologically strong enough to detect this relationship. This research was based on previous research that has been effective in manipulating metaphorically associated concepts (Elliot & Aarts, 2011; Slepian, Masicampo, Toosi & Ambady, 2012). Elliot et al. (2011) found that a pinch grip task was an effective measure in detecting differences in the strength and velocity of students when considering the effect of the colour red on motor output. Similarly, both Slepian et al. (2012) and Day and Bobocel (2013) demonstrated that self-determined important secrets or memories were capable of creating the perceived physical sensation of weight on the body. It may be the case that future thinking is not effective in creating the physical sensation of weight on the body, and thus is not useful in determining the influence importance on the body. The limitations of this study will now be addressed.

Limitations

The current study had a number of limitations in terms of its power, design, generalisability and its manipulation of importance. The samples size for this study was less than intended. Researchers aimed to test 40 individuals however only 34 individuals were tested. As a result the power of the study was lower than intended, reducing its ability to detect effects, although the number of participants was not greatly different to some previous research (Slepian Masicampo, Toosi & Ambady, 2012).

In addition the sample was principally acquaintances of the researcher as few first year psychology students volunteered. This offered a number of benefits. For

example, there was a higher mean age (24.6 years) and standard deviation (4.61 years) than could be expected for a first year psychology population. The sample was predominantly male, which again would be unusual in a first year psychology student population. While it was not recorded, the sample did include individuals who had never attended university, had studied topics other than psychology or who were post-university. It included participants who were unemployed and employed full time, as well as those in different stages of life. As a result, it's likely that this sample had greater demographic variability, at least to some extent, than a first year psychology student sample. Despite this, concerns still exist for the generalisability of these findings to the general population.

The assessment process faced some additional challenges in balancing the dual relationship between friend and researcher. As the researcher was known to many of the participants, they may not have taken the tasks as seriously as they might have if the research was being conducted by a stranger. Seriousness has been linked to importance in the literature (Ackerman, Novera & Bargh, 2010). Those who took the task less seriously may have moved more similarly to those in the Trivial group. In addition, the attention and effort participants put into these tasks may directly translate in the effort or force they produce.

A number of limitations were also present in the design of this research. While the between-groups design was chosen to better account for the learning and fatigue effects associated with the Purdue Pegboard and force tasks, it does not accommodate individual differences. Sizable individual differences were event in the data and this may have limited the ability of this research to detect differences between groups. While some of these differences would be due to more general factors, such as sex differences, strength or reaction time differences, some may

relate to the weight-importance relationship. For example, this research did not consider the circumstances in which individuals participated in this study, however it would be expected that these circumstances would vary. If an individual has something weighing on them, it will likely still weigh on them, independent of whether they are assigned to the trivial or important group. That is, any differences between individuals may be better explained by circumstances than group assignment. Unlike past events, which can be forgotten or temporarily out of mind, future events are likely to have recurring reminders. As a result, any individual with an important upcoming future event is likely to be continually influenced by it. While the perceptual influence of the weight-importance relationship may depend on immediate thought processes, its effect on human movement may be more enduring, in which case the effect of importance on human movement may be depend more on situational factors than cognitive or perceptual processes.

Individual differences may also exist with regard to the resilience of individuals in withstanding the perceptual influence of importance on movement. Individuals may also differ in how they respond to additional metaphorical weight. I expected it to decrease force and precision, however, evidence exists that could suggest an increase in force production. Slepian, Masicampo, Toosi and Ambady (2012) found that participants thinking about a meaningful secret tended to over throw a beanbag when aiming a container, compared with those considering a trivial secret. While Slepian et al. (2012) attributed this to an increase in estimated distance, an alternative possibility is that participants estimated the weight of the beanbag to be greater than it actually was and so exerted more force in their throwing attempt. This could suggest, at least in some circumstances, that additional metaphorical weight results in an increase in force production to account for this perceived additional weight.

This effect may be influenced by a number of additional factors. This could include the amount of perceived weight, type of importance, individual differences in motivation or task type (goal or otherwise).

Another consideration is that the researcher was not blinded to the group participants were in. It is possible that they unconsciously behaved in a way that interfered with these findings. However, the assignment to either the control or experimental group was pre-determined and based on the order in which individuals participated and so was not effected by experimenter bias.

Both the Purdue pegboard and force tasks were complex. Participants thought about either and important or trivial event, and then were bombarded with task instructions and rules. This may have interfered with the weight-importance relationship, with participants focused on the importance on completing the tasks, performing well or simply understanding that was expected of them. This may have overridden any effect of the weight-importance relationship. In addition, these tasks took a significant period of time, during which individuals were almost certainly be contemplating other things, most-likely their lack of enthusiasm in completing these tasks!

A final limitation is that importance is a complex, multidimensional and relative concept. A number of factors contribute to whether an event is consider important. While the present study attempted to account for a number of these factors, it did not consider all of them. In particular, previous research has also focused on elements of seriousness and guilt in their manipulation of importance. For example, as already discussed, Slepian, Masicampo, Toosi and Ambady (2012) and Day and Bobocel (2013) considered secrets and unethical memories in their manipulation of

importance. Both of these are likely to be highly loaded with elements of both seriousness and guilt. The current research considered importance more generally and while no measure of seriousness was obtained, participants rated their events largely positively, so it seems unlikely that they would include elements of guilt. This brings into question the precise nature of the importance-weight relationship. Previous research may demonstrate the embodiment of guilt. While guilt is likely to incorporate elements of importance, they may represent different concepts. Greater consideration could be given with regards to the metaphors being considered in research. Metaphors exist that relate to *carrying guilt*, whereas importance metaphors seems to represent *weight* more generally, for example, secrets are carried and evidence is weighed. If these concepts are distinct, then it may be the case that without guilt a weight may not be carried, but without importance those carrying guilt may not be carrying a heavy weight.

In terms of importance as a relative construct, the ability of this study to distinguish between important and unimportant events may have been limited by the *group* factor. When an individual rated the importance of their event, they may have done so with regard to their group. Those in the important group rated the importance of their event relative to other important events, and those in the trivial event did so relative to other trivial events. As a result an important trivial event is not equal to an important, important event. This limits the utility of these ratings in gaining a true understanding of the importance of events. Future research should consider ways to overcome this barrier if a similar questionnaire design is used.

It was suggested in the research proposal process that asking participants to write about important or trivial events would provide assurance that they were thinking about an event while also allowing events to be independently assessed for measures

such as these. While future research may wish to consider this option, I decided against it for concerns that participants would 'unburden' themselves with their writing (Park, Ramirez & Beilock, 2014).

Implications

This area of research has a number of real world implications. If the importance of life events or issues has the capacity to affect not only mood or cognition, but also movement and behaviours, then research in this area could be useful in a clinical sense. Individuals who describe feeling weighed down may be thought of as feeling low or depressed, tired or fatigued or lacking in motivation. Research has found that individuals suffering from major depression exert less effort for monetary incentives when compared to healthy controls (Cléry-Melin, Schmidt, Lafargue, Baup, Fossati & Pessiglione, 2011). It was also found that depressed participants had higher ratings of perceived effort than healthy controls when higher monetary incentives were present (Cléry-Melin et al. 2011). It was concluded that depressed participants behaved as if they did not want to gain higher rewards but felt that they exerted more effort (Cléry-Melin et al. 2011). These findings could be partly explained by the weight-importance relationship. With higher incentives, it becomes more important for individuals to perform well. However, for depressed individuals this translates into a greater weight, rather than motivation as it does for those without depression. The additional weight causes depressed individuals to feel they are exerting greater effort than they actually are. As a result, depressed individuals may respond poorly to motivational cues or emphasised importance, such as "get off the couch and do something" or "try harder" (Cléry-Melin et al. 2011). In saying, this friends and family may be placing additional importance on the individual. Rather than motivating them, this importance my actually weigh them down.

In terms of health, the perceived weight of importance may be something that individuals carry with them when they undertake physical activities, making them feel worn out more quickly. Alternatively, the increase in the perceived effort of physical tasks could create additional barriers to engaging in physical activity, where individuals feel like being physically active requires more effort. It is not known to what extent importance will motivate a behavioural change or weigh down individuals in overcoming the barriers to change. Bertholet, Gaume, Faouzi, Gmel and Daeppen (2012) found that the 'importance of changing' was not associated with reduced smoking six months later. When quitting smoking becomes an important priority, smokers may feel like quitting requires more effort or will place a greater pressure on them, reinforcing their need to smoke. More generally speaking, this area of research can provide further information about the human condition and how importance can influence performance. To what extent does importance increase performance or decrease performance?

While this research was not able to determine how importance influences the human movement through the physical sensation of weight on the body, it provides a starting point for future research in this area. Future findings may demonstrate how the interconnectedness between the mind and the body affect human movement and behaviour.

This experiment was a pilot approach in examining a number of factors suspected to influence or interact with the weight-importance relationship and the bilateral deficit. Due to the multifaceted nature of this study I was unable to make any conclusions with regard to the influence of this relationship on any single factor. Future research could consider independently examining the effect of future thinking on the weight-important relationship, as well as how the weight-importance relationship influences

human movement. Future studies could consider being more deliberate and careful in their manipulations of importance. Screening for individuals who have an upcoming important event may assist individuals in controlling for circumstances – and ensure that participants have an important event to consider. Specifying an event may also provide greater certainty in manipulation, for example, measuring a group of individuals before and after the same important life event. Research could also identify which elements of importance have the greatest influence with regards to the weight-importance relationship. For example, seriousness and guilt were not included in this research, however they were present as key elements in other research (Day & Bobocel, 2013; Slepian, Masicampo, Toosi & Ambady, 2012). As already discussed, previous research may demonstrate the embodiment of guilt, or seriousness and not importance more generally. Identifying which elements are involved would benefit our understanding of the weight-importance relationship and its potential influence on human movement.

In conclusion, the aim of this research was to consider if thinking about important future events influenced human movement and the bilateral deficit. Previous research has found that holding a heavy object can increase perceptions of importance (Ackerman, Novera & Bargh, 2010; Chandler, Reinhard & Schwarz, 2012; Jostmann, Lakens & Schubert, 2009; Kaspar, 2013) and thinking about unethical memories or secrets, can increase estimates of weight, distance, steepness and perceived effort (Day & Bobocel, 2013; Slepian, Masicampo, Toosi & Ambady, 2012). This study aimed to address the limitations within the literature, which has focused on past events or current issues in the manipulation of importance (Day et al. 2013; Slepian et al. 2012; Schneider, Rutjens, Jostmann & Lakens, 2011) and has not considered how movement is influenced by the weight-importance relationship.

Thirty-four participants thought about either an important or trivial event before completing tasks measuring manual dexterity and force production. No differences were found between important and trivial thinkers, suggesting that either thinking about important events does not influence human movement, or that thinking about future events has a lesser effect on the weight-important relationship. In addition, there was no evidence to suggest that this effect influenced the bilateral deficit. Future research is needed to determine the influence of the weight-importance relationship. This research acted as a pilot study, moving from the perceptual to the physical in examining the metaphorical association between weight and importance.

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Appendix A

A statement of ethics approval and additional experiment materials

Ethics Approval

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 2763
Fax: (03) 6226 7148
Katherine.Shaw@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

30 June 2015

Dr Michael Garry
Psychology
Private Bag 30

Dear Dr Garry

Re: FULL ETHICS APPLICATION APPROVAL
Ethics Ref: H0014923 - The effects of colour and future thinking on motor behaviour

We are pleased to advise that the Tasmania Social Sciences Human Research Ethics Committee approved the above project on 30 June 2015.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Natasha Jones
Administration Officer, Ethics

Information sheet

UNIVERSITY of TASMANIA | FACULTY OF HEALTH

Version1: 29 June 2015

Thinking about the Future and Human Movement

Invitation

To the participant

You are invited to participate in a study looking at how thinking about the future influences human movement. This research is being conducted as part of an Honours Project at the University of Tasmania by student researcher, Lauren Tilley, under the supervision of Dr. Mike Garry, Director of Learning and Teaching, Faculty of Health, Psychology Department.

What is the purpose of this study?

The aim of this study is to determine whether thinking about events in the future can influence human movements in terms of the force used and the precision of hand movements.

Why have I been invited to participate?

Anyone aged between 18 and 45, who is free from known neurological disorders, has normal or corrected-to-normal vision, and does not have a clinically diagnosed anxiety, depression or post-traumatic stress disorder, is invited to participant in this study. Participation in this study is voluntary and participants have the right to withdraw at any time without penalty.

What will I be asked to do?

You will be asked to fill out a questionnaire about a future event. You will NOT be asked to disclose what you are thinking about, but you will be asked to indicate its nature. You may also be asked to indicate how important that event is to you, how personally relevant it is, its distance in the future, the frequency at which you think about the event, how vivid or clear it is in your mind or whether it is positive or negative.

Once the questionnaire is completed you will be asked to participate in two movement tasks. One will involve placing as many small pegs in a board as you can in 30 seconds. The other will entail pinching a small disc-shaped force measurement device quickly and forcefully between the index finger and thumb. These tasks will be done with your left hand, right hand and both hands.

This will take place at the University of Tasmania, Sandy Bay Campus in the Human Motor Control Laboratory. It is expected to take approximately one hour to complete.

Are there any possible benefits from participation in this study?

Participants will have the chance to win one of two $50 Coles/Myer gift voucher or, for first year psychology students at the University of Tasmania, receive one hour research participation credit.

The findings from this study will contribute to a greater understanding of human movement and behaviour.

Are there any possible risks from participation in this study?

The risks involved in this study are minimal. Movement tasks could result in minor fatigue. Thinking about some future events may cause some individuals to feel uncomfortable or anxious. It is not the intention of this research to make you feel uncomfortable in any way,

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Version1: 29 June 2015

however if you do feel uncomfortable you have the right to withdraw at any time, without penalty or explanation to the researcher.
Should you desire further assistance the following free service is available:
Utas Counselling: Can be contacted on (03) 6226 2697 or at level 1, Student Centre, Administration Building, Sandy Bay Campus.

UTAS counsellors offer confidential and professional counselling to students experiencing a range of academic and personal concerns including (but not limited to) anxiety, stress, depression, motivational problems and relationship difficulties. This is a free service and students are absolutely encouraged to access these services if they're having difficulty concentrating on their studies due to the various complications we all experience from life.

What if I change my mind during or after the study?

You are free to change your mind and withdraw from the study at any time. This can be done without explanation to the researcher. Your data will be coded to protect your identity and as a result may be withdrawn at any point.

What will happen to the information when this study is over?

Data from this study will be treated in a confidential manner. You will be assigned a code number, by which your data can be re-identified.
The data for this study will be kept for at least five years from the date of publication and then destroyed. Data will be stored on a password-protected computer in a restricted access area of the University of Tasmania.

How will the results of the study be published?

A summary of the findings from this research will be published on the School of Psychology webpage (http://www.utas.edu.au/psychology/home) available from mid-October onwards.

What if I have questions about this study?

If you have any questions or concerns in regards to this study, please do not hesitate to contact us.

Student researcher: Lauren Tilley latilley@utas.edu.au
Supervisor: Dr. Mike Garry michael.garry@utas.edu.au

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number H14923.

This information sheet is for you to keep, so you can refer to it later if needed.

Consent form

Thinking about the Future and Human Movement

For Participants

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves thinking of a future event and completing a questionnaire about that event, as well as performing hand movement tasks. The expected time required for participation is one hour.
5. I understand that participation involves the risk(s) of minor fatigue and the possibility of experiencing stress or anxiety as a result of thinking about a future event.
6. I understand that all research data will be securely stored on the University of Tasmania's premises for five years from the publication of the study results, and will then be destroyed.
7. Any questions that I have asked have been answered to my satisfaction.
8. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
9. I understand that the results of the study will be published so that I cannot be identified as a participant.
10. I understand that my participation is voluntary and that I may withdraw at any time without any effect.

    If I so wish, I may request that any data I have supplied be withdrawn from the research until September 1, 2015.

Participant's name: _____

Participant's signature: _____

Date: _____

Statement by Investigator

☐ I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

☐ The participant has received the Information Sheet where my details have been provided so participants have had the opportunity to contact me prior to consenting to participate in this project.

Investigator's name: _____

Investigator's signature: _____

Date: _____

Edinburgh handedness inventory

Edinburgh Handedness Inventory

*Participant ID:*_____

D.O.B: _____ Sex: _____

- Please indicate your preferences in the use of hands in the following activities by *putting + in the appropriate column.* Where the preference is so strong that you would never try to use the other hand unless absolutely forced to, *put* ++. If in any case you are really indifferent put + in both columns.
- Some of the activities require both hands. In these cases the part of the task, or object, for which hand preference is wanted is indicated in brackets.
- Please try to answer all the questions, and only leave a blank if you have no experience at all with that object or task.

	Left	*Right*
1. Writing		
2. Drawing		
3. Throwing		
4. Scissors		
5. Toothbrush		
6. Knife (without fork)		
7. Spoon		
8. Broom (upper hand)		
9. Striking Match (match)		
10. Opening box (lid)		

L.Q.	Leave these spaces blank	DECLE

Oldfield, R.C. (1971).*The assessment and analysis of handedness: the Edinburgh inventory. Neuropsychologia, 9*, 97-113.

Important future events questionnaire

Thinking about the Future

We would like to ask you to think about an upcoming future event in your life. Specifically, we ask that you think of an upcoming event that will be important and notable. This event might involve considerable planning and preparation, and may be something that will produce a lasting memory. Examples might include a major assignment or exam, university graduation, getting engaged or married, having a child, buying a new car, or taking up a new job.
Once you have thought of something, we will ask you to answer some questions about the event. We will not ask you any specific details about the event, only questions about its general nature.

Now that you have an idea of what is being asked, please take a moment to think of a specific, upcoming future event.
Imagine yourself in that event.

- Think about where and when the event will take place.
- Who is involved?
- What is happening in that event?
- How do you think you will feel during that event?

When you are ready, please turn the page and answer the questions provided.

Please indicate the general nature of the event by placing an X by the relevant category(ies). If this event involves more than one category, select all appropriate categories:

☐ Relationship	☐ Work	☐ Financial
☐ Family	☐ Health	☐ Lifestyle
☐ Study	☐ Moral	☐ Other

For the following items, please draw a vertical mark on the line between the anchoring descriptors to indicate where on the scale the event sits.

1. How personally important is this event to you?

Not very important — Very Important

2. How personally relevant is this event to you?

Not very relevant — Very Relevant

3. When do you expect this event to occur?

In the next few days — More than six months

4. How often does this event come to mind?

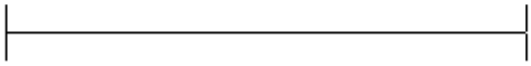
Almost never — Very often

5. How clearly can you imagine this event?

Very unclear — Very clear

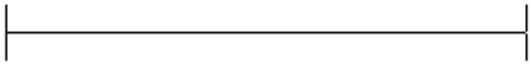
6. Is the nature of the event positive or negative?

Very positive — Very negative



7. Is your reaction or feeling about this event positive or negative?

Very positive — Very negative



Thanks!

Please inform the researcher when you have finished this task.

Trivial Future events questionnaire

Thinking about the Future

We would like to ask you to think about an upcoming future event in your life. Specifically, we ask that you think of an upcoming event that is a routine, trivial daily activity. This event should be something that you do with very little planning or preparation, and that you would not expect to produce a lasting memory. Examples might include getting ready for bed, making supper, walking to work or class, etc.
Once you have thought of something, we will ask you to answer some questions about the event. We will not ask you any specific details about the event, only questions about its general nature.

Now that you have an idea of what is being asked, please take a moment to think of a specific, upcoming future event.
Imagine yourself in that event.

- Think about where and when the event will take place.
- Who is involved?
- What is happing in that event?
- How do you think you will feel during that event?

When you are ready, please turn the page and answer the questions provided.

Please indicate the general nature of the event by placing an X by the relevant category(ies). If this event involves more than one category, select all appropriate categories:

☐ Relationship	☐ Work	☐ Financial
☐ Family	☐ Health	☐ Lifestyle
☐ Study	☐ Moral	☐ Other

For the following items, please draw a vertical mark on the line between the anchoring descriptors to indicate where on the scale the event sits.

1. How personally important is this event to you?

Not very important — Very Important

2. How personally relevant is this event to you?

Not very relevant — Very Relevant

3. When do you expect this event to occur?

In the next few days — More than six months

4. How often does this event come to mind?

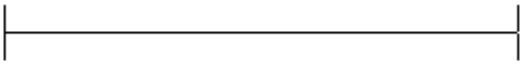
Almost never — Very often

5. How clearly can you imagine this event?

Very unclear — Very clear

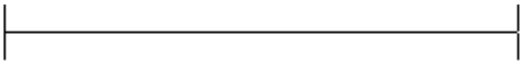
6. Is the nature of the event positive or negative?

Very positive — Very negative



7. Is your reaction or feeling about this event positive or negative?

Very positive — Very negative



Thanks!

Please inform the researcher when you have finished this task.

Appendix B

Questionnaire Statistics

Table B1

The mean rating of items on the questionnaire was largely similar between groups with the exception of importance, timeframe and clarity.

	Mean	Trivial		Important		Hedges g
		Mean	SD	mean	SD	
Importance	7.18	6.35	3.10	8.00	1.72	0.66
Relevance	8.48	8.15	2.21	8.82	2.43	0.29
Time	3.94	1.07	1.99	6.81	4.14	1.7672
Frequency	6.55	6.79	2.73	6.31	2.40	0.1867
Clarity	7.78	8.77	1.77	6.78	2.67	0.8785
Nature	3.16	3.22	3.05	3.09	2.62	0.0457
Feeling	3.26	2.68	2.65	3.84	2.46	0.4537

Table B2

Participants thought mostly about work, health and financial events. Large differences between groups were evident for relationship and health events.

Category	**Trivial group**	**Important group**	**Total**
Relationship	1	6	7
Family	3	4	7
Study	-	4	4
Work	4	6	10
Health	10	2	12
Moral	-	-	0
Financial	2	5	7
Lifestyle	8	5	13
Other	1	-	1

Table B3

The differences between groups on levels of importance was not significant.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Importance	Equal variances assumed	6.035	.020	1.914	32	.065	1.64412	.85894	-.10548	3.39372
	not assumed			1.914	25.00	.067	1.64412	.85894	-.12489	3.41313

Table B4

The differences between groups on the level of personal relevance was not significant.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Relevance	Equal variances assumed	.002	.967	.842	32	.406	.67059	.79657	-.95198	2.29316
	not assumed			.842	31.705	.406	.67059	.79657	-.95257	2.29375

Table B5

There was a significant difference between groups on the expected time-frame of the event.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Time_Frame	Equal variances assumed	21.308	.000	5.151	32	.000	5.74118	1.11468	3.47066	8.01170
	not assumed			5.151	22.993	.000	5.74118	1.11468	3.43525	8.04710

Table B6

There was no significant difference between Important and Trivial groups in the frequency with which events came to mind.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Frequency	Equal variances assumed	.778	.384	-.545	32	.590	-.47941	.88001	-2.27194	1.31312
	not assumed			-.545	31.484	.590	-.47941	.88001	-2.27310	1.31427

Table B7

Important and Trivial groups rated the clarity with which the events came to mind significantly different.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Clarity	Equal variances assumed	2.853	.101	-2.560	32	.015	-1.98824	.77674	-3.57041	-.40606
	not assumed			-2.560	27.789	.016	-1.98824	.77674	-3.57986	-.39661

Table B8

Important and Trivial groups did not differ in terms of whether the event was positive or negative.

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Nature	Equal variances assumed	.525	.474	-.130	32	.898	-.12647	.97541	-2.11332	1.86038
	not assumed			-.130	31.285	.898	-.12647	.97541	-2.11511	1.86217

Table B9

Important and Trivial groups did not differ in terms of their reaction to events (positive or negative).

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
									Lower	Upper
Feeling	Equal variances assumed	.000	.987	1.328	32	.194	1.16471	.87697	-.62161	2.95103
	not assumed			1.328	31.813	.194	1.16471	.87697	-.62203	2.95144

Appendix C

Pegboard analysis

Table C1

Summary of fixed effect and interactions for the number of pegs placed.

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	32.000	5748.683	.000
Group	1	32.000	1.225	.277
Condition	2	256.000	271.752	.000
Trial	2	256.000	18.234	.000
Group * Condition	2	256.000	.622	.538
Group * Trial	2	256.000	.841	.432
Condition * Trial	4	256.000	.134	.970
Group * Condition * Trial	4	256.000	.218	.928

Table C2

The number of pegs placed was not greatly different between important and trivial groups.

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Trivial	14.990	.276	32.000	14.429	15.552
Important	14.559	.276	32.000	13.997	15.120

Table C3

The dominant hand placed the most pegs, followed by the non-dominant hand and then both hands.

Condition	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Non-Dominant	15.059	.220	51.246	14.618	15.500
Dominant	16.667	.220	51.246	16.226	17.108
Bimanual	12.598	.220	51.246	12.157	13.039

Table C4

The dominant hand placed more pegs than the non-dominant hand. The non-dominant and dominant hands placed more pegs than when both hands were used.

Conditions compared		Mean Difference	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Non-Dominant	Dominant	-1.608*	.176	256.00	.000	-1.954	-1.262
Non-Dominant	Bimanual	2.461*	.176	256.00	.000	2.115	2.807
Dominant	Bimanual	4.069*	.176	256.00	.000	3.722	4.415

Table C5

The number of pegs placed increased across trial.

Trial	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
1	14.211	.220	51.25	13.770	14.652
2	14.848	.220	51.25	14.407	15.289
3	15.265	.220	51.25	14.824	15.706

Table C6

The first trial placed fewer pegs than the second, which placed fewer than the third trial.

Trials compared		Mean Difference	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
1	2	-.637*	.176	256.00	.000	-.983	-.291
1	3	-1.054*	.176	256.00	.000	-1.400	-.708
2	3	-.417*	.176	256.00	.019	-.763	-.070

Table C7

The number of pegs placed was not different across condition between Trivial and Important groups

Group	Condition	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Non-dominant	15.275	.311	51.246	14.651	15.898
	Dominant	16.980	.311	51.246	16.357	17.604
	Bimanual	12.716	.311	51.246	12.092	13.339
Important	Non-dominant	14.843	.311	51.246	14.219	15.467
	Dominant	16.353	.311	51.246	15.729	16.977
	Bimanual	12.480	.311	51.246	11.857	13.104

Table C8

The number of pegs placed across trials one, two and three did not differ between groups.

Group	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	1	14.304	.311	51.246	13.680	14.928
	2	15.167	.311	51.246	14.543	15.790
	3	15.500	.311	51.246	14.876	16.124
Important	1	14.118	.311	51.246	13.494	14.741
	2	14.529	.311	51.246	13.906	15.153
	3	15.029	.311	51.246	14.406	15.653

Table C9

The number of pegs placed in each trial did not differ across conditions.

Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Non-dominant	1	14.500	.281	121.28	13.943	15.057
	2	15.147	.281	121.28	14.590	15.704
	3	15.529	.281	121.28	14.972	16.086
Dominant	1	16.176	.281	121.28	15.619	16.734
	2	16.735	.281	121.28	16.178	17.292
	3	17.088	.281	121.28	16.531	17.645
Bimanual	1	11.956	.281	121.28	11.399	12.513
	2	12.662	.281	121.28	12.105	13.219
	3	13.176	.281	121.28	12.619	13.734

Table C10

There was no significant interaction between group, trial and condition, where group influenced the number of pegs placed for trial across condition.

Group	Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Non-dominant	1	14.706	.398	121.28	13.918	15.494
		2	15.353	.398	121.28	14.565	16.141
		3	15.765	.398	121.28	14.977	16.553
	Dominant	1	16.294	.398	121.28	15.506	17.082
		2	17.235	.398	121.28	16.447	18.023
		3	17.412	.398	121.28	16.624	18.200
	Bimanual	1	11.912	.398	121.28	11.124	12.700
		2	12.912	.398	121.28	12.124	13.700
		3	13.324	.398	121.28	12.536	14.111
Important	Non-dominant	1	14.294	.398	121.28	13.506	15.082
		2	14.941	.398	121.28	14.153	15.729
		3	15.294	.398	121.28	14.506	16.082
	Dominant	1	16.059	.398	121.28	15.271	16.847
		2	16.235	.398	121.28	15.447	17.023
		3	16.765	.398	121.28	15.977	17.553
	Bimanual	1	12.000	.398	121.28	11.212	12.788
		2	12.412	.398	121.28	11.624	13.200
		3	13.029	.398	121.28	12.242	13.817

Appendix D

Force Task analyses: Force Production

Table D1

Summary of fixed effect and interactions for force production

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	31.026	494.787	.000
Group	1	31.026	1.858	.183
Condition	1	1176.426	1.615	.204
Hand	1	1176.370	4.720	.030
Trial	9	1176.422	25.603	.000
Group * Condition	1	1176.426	1.464	.227
Group * Hand	1	1176.370	32.061	.000
Group * Trial	9	1176.422	.804	.613
Condition * Hand	1	1176.370	.009	.925
Condition * Trial	9	1176.416	.312	.971
Hand * Trial	9	1176.370	.445	.911
Group * Condition * Hand	1	1176.370	1.329	.249
Group * Condition * Trial	9	1176.416	.247	.987
Group * Hand * Trial	9	1176.370	.771	.643
Condition * Hand * Trial	9	1176.370	.292	.977
Group * Condition * Hand * Trial	9	1176.370	.723	.689

Table D2

The mean force for the Important group was slightly greater than that for the Trivial group.

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Trivial	.251	.017	31.020	.217	.285
Important	.284	.017	31.031	.249	.319

Table D3

There was little difference in the amount of force produced between unimanual and bimanual conditions.

Condition	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Unimanual	.270	.012	32.154	.245	.294
Bimanual	.265	.012	32.221	.241	.290

Table D4

The dominant hand produced greater force than the non-dominant hand.

Hand	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Non-dominant	.264	.012	32.196	.239	.289
Dominant	.271	.012	32.177	.246	.296

Table D5

The amount of force produced tended to decrease across trials.

Trial	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
1	.321	.013	42.260	.295	.347
2	.296	.013	42.880	.270	.322
3	.283	.013	42.046	.257	.309
4	.273	.013	42.160	.247	.300
5	.263	.013	41.954	.237	.289
6	.256	.013	41.840	.230	.282
7	.256	.013	42.046	.229	.282
8	.250	.013	42.342	.223	.276
9	.243	.013	42.281	.217	.269
10	.235	.013	42.389	.209	.261

Table D6

A pairwise comparisons for the significant effect of trial

Trials compared		Mean Difference	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
1	2	.025*	.007	1176.49	.001	.010	.039
	3	.038*	.007	1176.41	.000	.024	.052
	4	.048*	.007	1176.41	.000	.033	.062
	5	.058*	.007	1176.39	.000	.044	.072
	6	.065*	.007	1176.39	.000	.051	.079
	7	.065*	.007	1176.41	.000	.051	.080
	8	.071*	.007	1176.43	.000	.057	.086
	9	.078*	.007	1176.41	.000	.064	.093
	10	.086*	.007	1176.43	.000	.072	.101
2	3	.013	.007	1176.48	.076	-.001	.028
	4	.023*	.007	1176.45	.002	.008	.037

	5	.033*	.007	1176.47	.000	.019	.048
	6	.040*	.007	1176.46	.000	.026	.054
	7	.040*	.007	1176.48	.000	.026	.055
	8	.047*	.007	1176.53	.000	.032	.061
	9	.053*	.007	1176.52	.000	.039	.068
	10	.061*	.007	1176.49	.000	.047	.076
3	4	.010	.007	1176.41	.186	-.005	.024
	5	.020*	.007	1176.38	.006	.006	.034
	6	.027*	.007	1176.38	.000	.013	.041
	7	.027*	.007	1176.40	.000	.013	.042
	8	.033*	.007	1176.43	.000	.019	.048
	9	.040*	.007	1176.42	.000	.026	.055
	10	.048*	.007	1176.42	.000	.034	.063
4	5	.010	.007	1176.391	.153	-.004	.025
	6	.017*	.007	1176.386	.018	.003	.031
	7	.018*	.007	1176.405	.015	.003	.032
	8	.024*	.007	1176.435	.001	.009	.038
	9	.031*	.007	1176.432	.000	.016	.045
	10	.039*	.007	1176.425	.000	.024	.053
5	6	.007	.007	1176.367	.350	-.007	.021
	7	.007	.007	1176.384	.315	-.007	.022
	8	.013	.007	1176.417	.068	-.001	.028
	9	.020*	.007	1176.411	.006	.006	.034
	10	.028*	.007	1176.404	.000	.014	.042
6	7	.001	.007	1176.379	.940	-.014	.015
	8	.007	.007	1176.409	.366	-.008	.021
	9	.013	.007	1176.405	.066	-.001	.028
	10	.021*	.007	1176.397	.004	.007	.036
7	8	.006	.007	1176.426	.409	-.008	.020
	9	.013	.007	1176.424	.079	-.001	.027

	10	.021*	.007	1176.417	.005	.006	.035
8	9	.007	.007	1176.402	.355	-.008	.021
	10	.015*	.007	1176.398	.046	.000	.029
9	10	.008	.007	1176.395	.281	-.006	.022

Table D7

Mean force differed little between Important and Trivial groups across condition.

Group	Condition	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Unimanual	.251	.017	32.158	.217	.286
	Bimanual	.251	.017	32.194	.217	.285
Important	Unimanual	.288	.017	32.151	.253	.323
	Bimanual	.280	.017	32.245	.244	.315

Table D8

The dominant hand was greater than the non-dominant hand in the Trivial group, whereas the non-dominant hand was greater than the dominant hand in the Important group.

Group	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Non-dominant	.238	.017	32.187	.204	.273
	Dominant	.264	.017	32.164	.230	.298
Important	Non-dominant	.290	.017	32.204	.254	.325
	Dominant	.278	.017	32.189	.243	.314

Table D9

The mean force produced for each trial did not differ greatly between groups.

Group	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	1	.295	.018	42.707	.258	.331
	2	.273	.018	42.048	.237	.310
	3	.267	.018	42.265	.230	.303
	4	.260	.018	42.266	.223	.296
	5	.250	.018	41.840	.214	.287
	6	.242	.018	41.840	.206	.279
	7	.239	.018	42.265	.203	.276
	8	.237	.018	41.840	.201	.273
	9	.230	.018	42.266	.193	.266
	10	.219	.018	42.254	.182	.255
Important	1	.347	.019	41.840	.310	.385
	2	.319	.019	43.670	.281	.357
	3	.299	.019	41.840	.262	.337
	4	.287	.019	42.061	.250	.325
	5	.275	.019	42.061	.238	.313
	6	.270	.019	41.840	.232	.307
	7	.272	.019	41.840	.234	.309
	8	.262	.019	42.817	.224	.300
	9	.256	.019	42.296	.218	.294
	10	.251	.019	42.517	.214	.289

Table D10

Neither the force produced by the dominant hand nor non-dominant hand differed greatly between conditions.

Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	Non-dominant	.266	.012	34.544	.241	.291
	Dominant	.273	.012	34.465	.248	.298
Bimanual	Non-dominant	.262	.012	34.635	.237	.287
	Dominant	.269	.012	34.635	.244	.294

Table D11

The mean force produced across trials did not differ between conditions.

Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	1	.325	.014	56.680	.297	.353
	2	.303	.014	56.681	.275	.331
	3	.286	.014	55.697	.258	.314
	4	.274	.014	56.219	.246	.302
	5	.265	.014	56.218	.237	.293
	6	.258	.014	55.697	.230	.286
	7	.260	.014	55.697	.232	.288
	8	.252	.014	55.697	.224	.280
	9	.239	.014	55.697	.211	.267
	10	.235	.014	57.143	.206	.263
Bimanual	1	.317	.014	56.641	.289	.345
	2	.289	.014	59.449	.261	.318
	3	.280	.014	56.641	.252	.308
	4	.273	.014	56.643	.245	.301
	5	.261	.014	55.697	.233	.289
	6	.255	.014	55.697	.227	.283
	7	.251	.014	56.641	.223	.279
	8	.248	.014	58.009	.219	.276
	9	.247	.014	57.728	.218	.275
	10	.235	.014	56.774	.207	.263

Table D12

The mean force produced did not differ between hands across trials.

Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Non-dominant	1	.317	.014	57.141	.289	.345
	2	.284	.014	57.980	.256	.312
	3	.283	.014	56.157	.255	.311
	4	.271	.014	56.681	.243	.299
	5	.261	.014	56.218	.234	.289
	6	.250	.014	55.697	.222	.277
	7	.253	.014	56.157	.225	.281
	8	.247	.014	56.819	.219	.275
	9	.242	.014	56.682	.214	.270
	10	.233	.014	57.206	.204	.261
Dominant	1	.325	.014	56.157	.297	.353
	2	.308	.014	58.069	.280	.337
	3	.283	.014	56.157	.255	.311
	4	.276	.014	56.157	.248	.304
	5	.264	.014	55.697	.237	.292
	6	.263	.014	55.697	.235	.291
	7	.258	.014	56.157	.230	.286
	8	.252	.014	56.819	.224	.280
	9	.244	.014	56.682	.216	.272
	10	.237	.014	56.682	.209	.265

Table D13

There was no significant interaction between group, condition and hand.

Group	Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	.236	.017	34.558	.201	.271
		Dominant	.266	.017	34.464	.231	.301
	Bimanual	Non-dominant	.240	.017	34.584	.205	.275
		Dominant	.262	.017	34.584	.227	.297
Important	Unimanual	Non-dominant	.295	.018	34.530	.259	.331
		Dominant	.281	.018	34.466	.245	.317
	Bimanual	Non-dominant	.284	.018	34.683	.248	.320
		Dominant	.276	.018	34.683	.240	.312

Table D14

There was no significant interaction between group, condition and trial

Group	Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	1	.294	.020	57.734	.255	.333
		2	.280	.019	56.648	.240	.319
		3	.267	.019	55.697	.228	.306
		4	.257	.019	55.697	.218	.296
		5	.256	.019	55.697	.217	.295
		6	.243	.019	55.697	.204	.281
		7	.240	.019	55.697	.202	.279
		8	.235	.019	55.697	.197	.274
		9	.222	.019	55.697	.183	.261
		10	.219	.020	57.602	.180	.259
	Bimanual	1	.296	.020	57.653	.256	.335
		2	.267	.019	55.697	.228	.306
		3	.267	.020	57.653	.228	.306
		4	.262	.020	57.655	.223	.301
		5	.245	.019	55.697	.206	.284
		6	.242	.019	55.697	.203	.281
		7	.238	.020	57.653	.199	.277
		8	.239	.019	55.697	.200	.277
		9	.237	.020	57.655	.198	.277
		10	.218	.019	55.697	.179	.257
Important	Unimanual	1	.357	.020	55.697	.316	.397
		2	.326	.020	56.712	.286	.366
		3	.306	.020	55.697	.266	.346
		4	.290	.020	56.712	.250	.330
		5	.275	.020	56.711	.235	.315

		6	.273	.020	55.697	.233	.313
		7	.280	.020	55.697	.240	.320
		8	.268	.020	55.697	.228	.308
		9	.256	.020	55.697	.216	.296
		10	.250	.020	56.712	.209	.290
	Bimanual	1	.338	.020	55.697	.298	.378
		2	.312	.021	63.083	.271	.353
		3	.292	.020	55.697	.252	.332
		4	.285	.020	55.697	.244	.325
		5	.276	.020	55.697	.236	.316
		6	.267	.020	55.697	.227	.307
		7	.264	.020	55.697	.224	.304
		8	.256	.020	60.226	.216	.297
		9	.256	.020	57.796	.215	.296
		10	.253	.020	57.796	.212	.293

Table D15

There was no significant interaction between group, hand and trial.

Group	**Hand**	**Trial**	**Mean**	**Std. Error**	**df**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Trivial	Non-dominant	1	.277	.020	58.694	.238	.316
		2	.249	.019	56.648	.209	.288
		3	.259	.019	56.648	.220	.298
		4	.246	.019	56.648	.207	.285
		5	.237	.019	55.697	.198	.276
		6	.221	.019	55.697	.182	.260
		7	.229	.019	56.648	.190	.268

		8	.225	.019	55.697	.186	.263
		9	.227	.019	56.648	.188	.266
		10	.214	.019	56.647	.175	.253
	Dominant	1	.312	.019	56.648	.273	.351
		2	.298	.019	55.697	.259	.337
		3	.274	.019	56.648	.235	.313
		4	.273	.019	56.648	.234	.312
		5	.264	.019	55.697	.225	.303
		6	.264	.019	55.697	.225	.303
		7	.250	.019	56.648	.211	.289
		8	.249	.019	55.697	.211	.288
		9	.233	.019	56.648	.194	.272
		10	.223	.019	56.647	.184	.262
Important	Non-dominant	1	.358	.020	55.697	.318	.398
		2	.319	.020	59.246	.279	.360
		3	.306	.020	55.697	.266	.346
		4	.296	.020	56.712	.255	.336
		5	.286	.020	56.711	.246	.326
		6	.278	.020	55.697	.238	.318
		7	.277	.020	55.697	.237	.317
		8	.269	.020	57.884	.229	.309
		9	.257	.020	56.714	.217	.297
		10	.251	.020	57.734	.210	.291
	Dominant	1	.337	.020	55.697	.297	.377
		2	.319	.020	60.343	.278	.360
		3	.292	.020	55.697	.252	.332
		4	.279	.020	55.697	.239	.319
		5	.265	.020	55.697	.225	.305
		6	.262	.020	55.697	.222	.302

		7	.267	.020	55.697	.227	.307
		8	.255	.020	57.884	.215	.296
		9	.255	.020	56.714	.214	.295
		10	.252	.020	56.714	.211	.292

Table D16

There was no significant interaction between condition, hand and trial.

Condition	**Hand**	**Trial**	**Mean**	**Std. Error**	**df**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Unimanual	Non-dominant	1	.318	.016	93.641	.286	.349
		2	.286	.016	91.035	.255	.318
		3	.287	.016	88.759	.255	.318
		4	.268	.016	91.341	.237	.299
		5	.266	.016	91.338	.234	.297
		6	.250	.016	88.759	.219	.281
		7	.258	.016	88.759	.226	.289
		8	.250	.016	88.759	.218	.281
		9	.242	.016	88.759	.211	.273
		10	.235	.016	93.642	.204	.267
	Dominant	1	.333	.016	88.759	.301	.364
		2	.319	.016	91.341	.288	.351
		3	.286	.016	88.759	.255	.317
		4	.279	.016	88.759	.248	.310
		5	.265	.016	88.759	.234	.296
		6	.265	.016	88.759	.234	.296
		7	.263	.016	88.759	.232	.294
		8	.254	.016	88.759	.222	.285

		9	.236	.016	88.759	.205	.267
		10	.234	.016	91.033	.202	.265
Bimanual	Non-dominant	1	.317	.016	91.034	.286	.348
		2	.282	.016	97.827	.250	.314
		3	.279	.016	91.034	.248	.311
		4	.273	.016	91.035	.242	.305
		5	.257	.016	88.759	.226	.288
		6	.249	.016	88.759	.218	.280
		7	.248	.016	91.034	.217	.280
		8	.244	.016	94.333	.212	.276
		9	.242	.016	93.650	.210	.273
		10	.230	.016	91.346	.198	.261
	Dominant	1	.317	.016	91.034	.285	.348
		2	.297	.016	97.827	.265	.329
		3	.280	.016	91.034	.249	.311
		4	.273	.016	91.035	.242	.304
		5	.264	.016	88.759	.233	.295
		6	.260	.016	88.759	.229	.292
		7	.254	.016	91.034	.223	.285
		8	.251	.016	94.333	.220	.283
		9	.251	.016	93.650	.220	.283
		10	.241	.016	91.346	.209	.272

Table D17

There was no significant interaction between group, condition, hand and trial.

Group	Condition	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
							Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	1	.262	.022	98.949	.217	.307
			2	.243	.022	93.480	.199	.287
			3	.257	.022	88.759	.214	.301
			4	.239	.022	88.759	.196	.283
			5	.249	.022	88.759	.206	.293
			6	.220	.022	88.759	.177	.264
			7	.231	.022	88.759	.188	.274
			8	.219	.022	88.759	.176	.263
			9	.223	.022	88.759	.179	.266
			10	.219	.022	93.475	.175	.263
		Dominant	1	.325	.022	88.759	.282	.369
			2	.316	.022	88.759	.273	.359
			3	.276	.022	88.759	.233	.319
			4	.275	.022	88.759	.231	.318
			5	.262	.022	88.759	.219	.305
			6	.265	.022	88.759	.222	.308
			7	.250	.022	88.759	.207	.293

		8	.251	.022	88.759	.208	.295
		9	.221	.022	88.759	.178	.265
		10	.220	.022	93.475	.176	.264
Bimanual	Non-dominant	1	.292	.022	93.478	.248	.336
		2	.254	.022	88.759	.211	.297
		3	.262	.022	93.478	.218	.306
		4	.252	.022	93.480	.208	.296
		5	.225	.022	88.759	.181	.268
		6	.222	.022	88.759	.178	.265
		7	.227	.022	93.478	.183	.271
		8	.230	.022	88.759	.186	.273
		9	.231	.022	93.480	.187	.275
		10	.210	.022	88.759	.166	.253
	Dominant	1	.299	.022	93.478	.256	.343
		2	.279	.022	88.759	.236	.323
		3	.273	.022	93.478	.229	.317
		4	.272	.022	93.480	.228	.316
		5	.265	.022	88.759	.222	.309
		6	.263	.022	88.759	.219	.306
		7	.250	.022	93.478	.206	.294
		8	.247	.022	88.759	.204	.291
		9	.244	.022	93.480	.200	.288

			10	.226	.022	88.759	.182	.269
Important	Unimanual	Non-dominant	1	.373	.023	88.759	.329	.418
			2	.330	.023	88.759	.285	.374
			3	.316	.023	88.759	.271	.360
			4	.297	.023	93.799	.251	.342
			5	.282	.023	93.793	.237	.327
			6	.280	.023	88.759	.236	.325
			7	.284	.023	88.759	.239	.329
			8	.280	.023	88.759	.235	.325
			9	.262	.023	88.759	.217	.306
			10	.252	.023	93.799	.206	.297
		Dominant	1	.340	.023	88.759	.295	.385
			2	.323	.023	93.799	.277	.368
			3	.297	.023	88.759	.252	.341
			4	.283	.023	88.759	.239	.328
			5	.268	.023	88.759	.223	.312
			6	.266	.023	88.759	.221	.310
			7	.276	.023	88.759	.231	.321
			8	.256	.023	88.759	.211	.301
			9	.251	.023	88.759	.206	.296
			10	.248	.023	88.759	.203	.292
	Bimanual	Non-dominant	1	.342	.023	88.759	.298	.387

		2	.309	.024	106.696	.262	.356
		3	.297	.023	88.759	.252	.342
		4	.295	.023	88.759	.250	.339
		5	.290	.023	88.759	.245	.334
		6	.276	.023	88.759	.231	.321
		7	.270	.023	88.759	.225	.314
		8	.258	.023	99.709	.212	.304
		9	.253	.023	93.809	.208	.298
		10	.250	.023	93.809	.204	.295
	Dominant	1	.334	.023	88.759	.289	.379
		2	.315	.024	106.696	.268	.362
		3	.288	.023	88.759	.243	.332
		4	.274	.023	88.759	.230	.319
		5	.263	.023	88.759	.218	.307
		6	.258	.023	88.759	.213	.303
		7	.258	.023	88.759	.214	.303
		8	.255	.023	99.709	.209	.301
		9	.258	.023	93.809	.213	.304
		10	.256	.023	93.809	.210	.301

Appendix E

Force Task analyses: Reaction Tim

Table E1

Summary of fixed effects and interactions for reaction time

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	31.047	889.803	.000
Group	1	31.047	.975	.331
Condition	1	1176.341	1.380	.240
Hand	1	1176.157	.006	.939
Trial	9	1176.327	6.216	.000
Group * Condition	1	1176.341	2.211	.137
Group * Hand	1	1176.157	1.686	.194
Group * Trial	9	1176.327	.705	.705
Condition * Hand	1	1176.157	1.554	.213
Condition * Trial	9	1176.310	.836	.583
Hand * Trial	9	1176.158	.984	.451
Group * Condition * Hand	1	1176.157	1.160	.282
Group * Condition * Trial	9	1176.310	.709	.701
Group * Hand * Trial	9	1176.158	.294	.977
Condition * Hand * Trial	9	1176.158	.629	.773
Group * Condition * Hand * Trial	9	1176.158	.265	.984

Table E2

There was little difference between Important and Trivial group reaction times.

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Trivial	.214	.010	31.028	.194	.233
Important	.200	.010	31.065	.180	.220

Table E3

There was little difference between Unimanual and Bimanual reaction times.

Condition	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Unimanual	.209	.007	34.860	.194	.223
Bimanual	.205	.007	35.087	.190	.219

Table E4

There was no difference between mean dominant and non-dominant reaction times.

Hand	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Non-dominant	.207	.007	35.002	.192	.221
Dominant	.207	.007	34.936	.192	.221

Table E5

Reaction time tended to decrease across trials.

Trial	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
1	.236	.009	74.419	.219	.253
2	.225	.009	77.073	.208	.242
3	.198	.009	73.504	.181	.216
4	.205	.009	73.993	.188	.223
5	.193	.009	73.113	.176	.210
6	.199	.009	72.627	.182	.217
7	.197	.009	73.504	.180	.214
8	.206	.009	74.768	.189	.223
9	.207	.009	74.508	.190	.224
10	.199	.009	74.974	.182	.216

Table E6

The pairwise comparison for the significant effect of trial

Trials compared		Mean Difference	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
1	2	.011	.008	1176.542	.148	-.004	.027
	3	.038*	.008	1176.283	.000	.023	.053
	4	.031*	.008	1176.303	.000	.016	.046
	5	.043*	.008	1176.226	.000	.028	.058
	6	.037*	.008	1176.211	.000	.022	.052
	7	.039*	.008	1176.283	.000	.024	.054
	8	.030*	.008	1176.362	.000	.015	.045
	9	.029*	.008	1176.297	.000	.014	.044
	10	.037*	.008	1176.339	.000	.022	.052
2	1	-.011	.008	1176.542	.148	-.027	.004
	3	.027*	.008	1176.519	.001	.011	.042
	4	.020*	.008	1176.411	.012	.004	.035
	5	.032*	.008	1176.493	.000	.017	.047
	6	.026*	.008	1176.462	.001	.010	.041
	7	.028*	.008	1176.519	.000	.013	.043
	8	.019*	.008	1176.694	.015	.004	.034
	9	.018*	.008	1176.642	.023	.002	.033
	10	.026*	.008	1176.554	.001	.011	.041
3	1	-.038*	.008	1176.283	.000	-.053	-.023
	2	-.027*	.008	1176.519	.001	-.042	-.011
	4	-.007	.008	1176.273	.360	-.022	.008
	5	.005	.008	1176.204	.500	-.010	.020
	6	-.001	.008	1176.188	.893	-.016	.014
	7	.001	.008	1176.253	.881	-.014	.016
	8	-.008	.008	1176.342	.315	-.023	.007
	9	-.009	.008	1176.336	.247	-.024	.006
	10	-.001	.008	1176.311	.932	-.016	.014

4	1	-.031*	.008	1176.303	.000	-.046	-.016
	2	-.020*	.008	1176.411	.012	-.035	-.004
	3	.007	.008	1176.273	.360	-.008	.022
	5	.012	.008	1176.226	.112	-.003	.027
	6	.006	.008	1176.208	.433	-.009	.021
	7	.008	.008	1176.273	.287	-.007	.023
	8	-.001	.008	1176.372	.926	-.016	.014
	9	-.002	.008	1176.361	.806	-.017	.013
	10	.006	.008	1176.338	.410	-.009	.021
5	1	-.043*	.008	1176.226	.000	-.058	-.028
	2	-.032*	.008	1176.493	.000	-.047	-.017
	3	-.005	.008	1176.204	.500	-.020	.010
	4	-.012	.008	1176.226	.112	-.027	.003
	6	-.006	.008	1176.146	.417	-.021	.009
	7	-.004	.008	1176.204	.600	-.019	.011
	8	-.013	.008	1176.311	.094	-.028	.002
	9	-.014	.008	1176.292	.067	-.029	.001
	10	-.006	.008	1176.270	.450	-.021	.009
6	1	-.037*	.008	1176.211	.000	-.052	-.022
	2	-.026*	.008	1176.462	.001	-.041	-.010
	3	.001	.008	1176.188	.893	-.014	.016
	4	-.006	.008	1176.208	.433	-.021	.009
	5	.006	.008	1176.146	.417	-.009	.021
	7	.002	.008	1176.188	.775	-.013	.017
	8	-.007	.008	1176.286	.382	-.022	.008
	9	-.008	.008	1176.271	.304	-.023	.007
	10	.000	.008	1176.247	.962	-.015	.015
7	1	-.039*	.008	1176.283	.000	-.054	-.024
	2	-.028*	.008	1176.519	.000	-.043	-.013
	3	-.001	.008	1176.253	.881	-.016	.014
	4	-.008	.008	1176.273	.287	-.023	.007
	5	.004	.008	1176.204	.600	-.011	.019
	6	-.002	.008	1176.188	.775	-.017	.013
	8	-.009	.008	1176.342	.249	-.024	.006
	9	-.010	.008	1176.336	.191	-.025	.005

	10	-.002	.008	1176.311	.815	-.017	.013
8	1	-.030*	.008	1176.362	.000	-.045	-.015
	2	-.019*	.008	1176.694	.015	-.034	-.004
	3	.008	.008	1176.342	.315	-.007	.023
	4	.001	.008	1176.372	.926	-.014	.016
	5	.013	.008	1176.311	.094	-.002	.028
	6	.007	.008	1176.286	.382	-.008	.022
	7	.009	.008	1176.342	.249	-.006	.024
	9	-.001	.008	1176.263	.879	-.016	.014
	10	.007	.008	1176.251	.361	-.008	.022
9	1	-.029*	.008	1176.297	.000	-.044	-.014
	2	-.018*	.008	1176.642	.023	-.033	-.002
	3	.009	.008	1176.336	.247	-.006	.024
	4	.002	.008	1176.361	.806	-.013	.017
	5	.014	.008	1176.292	.067	-.001	.029
	6	.008	.008	1176.271	.304	-.007	.023
	7	.010	.008	1176.336	.191	-.005	.025
	8	.001	.008	1176.263	.879	-.014	.016
	10	.008	.008	1176.239	.286	-.007	.023
10	1	-.037*	.008	1176.339	.000	-.052	-.022
	2	-.026*	.008	1176.554	.001	-.041	-.011
	3	.001	.008	1176.311	.932	-.014	.016
	4	-.006	.008	1176.338	.410	-.021	.009
	5	.006	.008	1176.270	.450	-.009	.021
	6	.000	.008	1176.247	.962	-.015	.015
	7	.002	.008	1176.311	.815	-.013	.017
	8	-.007	.008	1176.251	.361	-.022	.008
	9	-.008	.008	1176.239	.286	-.023	.007

Table E7

There was little difference in reaction time between groups for unimanual and bimanual movements.

Group	Condition	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Unimanual	.218	.010	34.871	.198	.238
	Bimanual	.209	.010	34.997	.189	.229
Important	Unimanual	.199	.010	34.850	.179	.220
	Bimanual	.200	.010	35.171	.180	.221

Table E8

There was little difference in reaction time between groups for dominant and non-dominant hands.

Group	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Non-dominant	.216	.010	34.97	.196	.236
	Dominant	.211	.010	34.89	.191	.231
Important	Non-dominant	.198	.010	35.03	.177	.219
	Dominant	.202	.010	34.98	.181	.223

Table E9

There was little difference in reaction time between groups across different trials.

Group	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	1	.245	.012	76.343	.221	.270
	2	.229	.012	73.513	.205	.253
	3	.207	.012	74.440	.183	.231
	4	.214	.012	74.442	.190	.238
	5	.204	.012	72.627	.180	.228
	6	.206	.012	72.627	.183	.230
	7	.206	.012	74.440	.182	.230
	8	.201	.012	72.627	.177	.225
	9	.218	.012	74.442	.194	.242
	10	.205	.012	74.398	.181	.229
Important	1	.227	.012	72.627	.202	.252
	2	.221	.013	80.492	.196	.246
	3	.190	.012	72.627	.165	.214
	4	.197	.012	73.572	.172	.221
	5	.182	.012	73.571	.158	.207
	6	.192	.012	72.627	.168	.217
	7	.188	.012	72.627	.164	.213
	8	.211	.013	76.807	.186	.236
	9	.197	.012	74.569	.172	.222
	10	.193	.012	75.518	.169	.218

Table E10

There was little difference between conditions in the reaction time of dominant and non-dominant hands.

Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	Non-dominant	.211	.008	43.396	.196	.226
	Dominant	.206	.008	43.107	.191	.222
Bimanual	Non-dominant	.203	.008	43.732	.187	.218
	Dominant	.207	.008	43.732	.191	.222

Table E11

Reaction did not differ between unimanual and bimanual conditions across trials.

Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	1	.241	.010	141.259	.221	.261
	2	.217	.010	141.261	.197	.237
	3	.198	.010	136.496	.178	.218
	4	.209	.010	139.020	.189	.229
	5	.200	.010	139.018	.180	.220
	6	.196	.010	136.496	.176	.216
	7	.205	.010	136.496	.185	.225
	8	.204	.010	136.496	.184	.224
	9	.213	.010	136.496	.193	.233
	10	.203	.010	143.506	.183	.223
Bimanual	1	.232	.010	141.053	.211	.252
	2	.233	.010	154.687	.212	.254
	3	.198	.010	141.053	.178	.218
	4	.202	.010	141.056	.182	.222
	5	.186	.010	136.496	.166	.206
	6	.202	.010	136.496	.182	.222
	7	.190	.010	141.053	.169	.210
	8	.208	.010	147.673	.187	.228
	9	.201	.010	146.304	.181	.222
	10	.195	.010	141.683	.175	.215

Table E12

Reaction did not differ between dominant and non-dominant hands across trials.

Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Non-dominant	1	.236	.010	143.499	.215	.256
	2	.224	.010	147.581	.203	.244
	3	.204	.010	138.721	.184	.224
	4	.200	.010	141.261	.180	.220
	5	.199	.010	139.018	.179	.219
	6	.206	.010	136.496	.186	.226
	7	.199	.010	138.721	.179	.219
	8	.209	.010	141.928	.189	.230
	9	.203	.010	141.265	.183	.223
	10	.189	.010	143.810	.169	.210
Dominant	1	.237	.010	138.721	.217	.257
	2	.226	.010	147.994	.206	.247
	3	.193	.010	138.721	.173	.213
	4	.211	.010	138.722	.191	.231
	5	.187	.010	136.496	.167	.207
	6	.193	.010	136.496	.173	.213
	7	.195	.010	138.721	.175	.215
	8	.203	.010	141.928	.183	.223
	9	.211	.010	141.265	.191	.232
	10	.209	.010	141.263	.189	.229

Table E13

There was no significant interaction between group, condition and hand.

Group	Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	.224	.010	43.450	.203	.246
		Dominant	.212	.010	43.103	.191	.233
	Bimanual	Non-dominant	.207	.011	43.545	.186	.229
		Dominant	.211	.011	43.545	.189	.232
Important	Unimanual	Non-dominant	.198	.011	43.346	.176	.219
		Dominant	.201	.011	43.110	.179	.223
	Bimanual	Non-dominant	.198	.011	43.908	.176	.220
		Dominant	.203	.011	43.908	.181	.225

Table E14

There was no significant interaction between group, condition and trial.

Group	Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	1	.249	.014	146.384	.221	.278
		2	.219	.014	141.102	.191	.247
		3	.205	.014	136.496	.177	.233
		4	.220	.014	136.496	.192	.247
		5	.216	.014	136.496	.188	.244
		6	.209	.014	136.496	.181	.237
		7	.215	.014	136.496	.188	.243
		8	.212	.014	136.496	.184	.240
		9	.223	.014	136.496	.195	.250
		10	.214	.014	145.743	.186	.242
	Bimanual	1	.242	.014	145.952	.213	.270
		2	.239	.014	136.496	.212	.267
		3	.209	.014	145.952	.181	.237
		4	.209	.014	145.960	.180	.237
		5	.192	.014	136.496	.164	.220
		6	.204	.014	136.496	.176	.232
		7	.196	.014	145.952	.168	.225
		8	.191	.014	136.496	.163	.219
		9	.213	.014	145.960	.184	.241
		10	.195	.014	136.496	.167	.223
Important	Unimanual	1	.233	.015	136.496	.204	.261
		2	.215	.015	141.411	.186	.244
		3	.192	.015	136.496	.164	.221
		4	.198	.015	141.411	.169	.227
		5	.185	.015	141.407	.156	.214

		6	.184	.015	136.496	.155	.213
		7	.194	.015	136.496	.165	.223
		8	.197	.015	136.496	.168	.226
		9	.204	.015	136.496	.175	.232
		10	.192	.015	141.411	.163	.221
	Bimanual	1	.221	.015	136.496	.193	.250
		2	.226	.015	172.499	.196	.257
		3	.187	.015	136.496	.159	.216
		4	.195	.015	136.496	.166	.223
		5	.180	.015	136.496	.152	.209
		6	.201	.015	136.496	.172	.230
		7	.183	.015	136.496	.154	.212
		8	.225	.015	158.469	.195	.255
		9	.190	.015	146.627	.161	.219
		10	.195	.015	146.627	.166	.224

Table E15

No significant interaction between group, hand and trial.

Group	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Non-dominant	1	.244	.014	151.077	.215	.273
		2	.232	.014	141.102	.204	.260
		3	.215	.014	141.100	.187	.244
		4	.204	.014	141.102	.176	.232
		5	.213	.014	136.496	.186	.241
		6	.218	.014	136.496	.190	.246
		7	.209	.014	141.100	.181	.237
		8	.207	.014	136.496	.179	.235
		9	.216	.014	141.102	.188	.245
		10	.200	.014	141.098	.172	.228
	Dominant	1	.247	.014	141.100	.219	.275
		2	.226	.014	136.496	.198	.254
		3	.198	.014	141.100	.170	.226
		4	.224	.014	141.102	.196	.252
		5	.195	.014	136.496	.167	.222
		6	.195	.014	136.496	.167	.223
		7	.203	.014	141.100	.175	.231
		8	.196	.014	136.496	.168	.224
		9	.219	.014	141.102	.191	.247
		10	.210	.014	141.098	.181	.238
Important	Non-dominant	1	.227	.015	136.496	.198	.256
		2	.215	.015	153.771	.186	.245
		3	.192	.015	136.496	.163	.221
		4	.196	.015	141.411	.167	.225
		5	.185	.015	141.407	.156	.214

		6	.193	.015	136.496	.165	.222
		7	.189	.015	136.496	.161	.218
		8	.212	.015	147.109	.183	.241
		9	.190	.015	141.418	.161	.219
		10	.179	.015	146.380	.150	.208
	Dominant	1	.227	.015	136.496	.198	.256
		2	.226	.015	159.110	.196	.256
		3	.188	.015	136.496	.159	.217
		4	.198	.015	136.496	.169	.226
		5	.180	.015	136.496	.152	.209
		6	.191	.015	136.496	.162	.220
		7	.188	.015	136.496	.159	.216
		8	.210	.015	147.109	.181	.239
		9	.204	.015	141.418	.175	.233
		10	.208	.015	141.418	.179	.237

Table E16

No significant interaction between condition, hand and trial.

Condition	**Hand**	**Trial**	**Mean**	**Std. Error**	**df**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Unimanual	Non-dominant	1	.243	.013	323.864	.217	.268
		2	.218	.013	311.403	.193	.244
		3	.210	.013	300.437	.185	.234
		4	.202	.013	312.868	.176	.227
		5	.211	.013	312.860	.186	.236
		6	.206	.013	300.437	.181	.231
		7	.210	.013	300.437	.185	.235
		8	.216	.013	300.437	.191	.240
		9	.208	.013	300.437	.183	.233
		10	.186	.013	323.865	.161	.212
	Dominant	1	.239	.013	300.437	.214	.264

		2	.216	.013	312.868	.191	.241
		3	.187	.013	300.437	.163	.212
		4	.216	.013	300.437	.192	.241
		5	.189	.013	300.437	.164	.214
		6	.187	.013	300.437	.162	.212
		7	.199	.013	300.437	.174	.224
		8	.193	.013	300.437	.168	.218
		9	.218	.013	300.437	.193	.243
		10	.220	.013	311.396	.195	.245
Bimanual	Non-dominant	1	.228	.013	311.399	.203	.253
		2	.229	.013	343.621	.203	.255
		3	.198	.013	311.399	.173	.223
		4	.198	.013	311.403	.173	.223
		5	.187	.013	300.437	.162	.212
		6	.205	.013	300.437	.180	.230
		7	.188	.013	311.399	.163	.213
		8	.203	.013	327.134	.178	.229
		9	.198	.013	323.885	.173	.224
		10	.192	.013	312.881	.167	.217
	Dominant	1	.235	.013	311.399	.210	.260
		2	.237	.013	343.621	.211	.263
		3	.199	.013	311.399	.174	.224
		4	.205	.013	311.403	.180	.230
		5	.186	.013	300.437	.161	.211
		6	.199	.013	300.437	.174	.224
		7	.191	.013	311.399	.166	.216
		8	.212	.013	327.134	.187	.238
		9	.205	.013	323.885	.179	.230
		10	.198	.013	312.881	.173	.223

Table E17

No significant interaction between group, condition, hand and trial.

Group	Condition	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
							Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	1	.250	.018	348.876	.214	.286
			2	.230	.018	323.091	.195	.266
			3	.221	.018	300.437	.187	.256
			4	.205	.018	300.437	.170	.239
			5	.231	.018	300.437	.196	.265
			6	.224	.018	300.437	.189	.258
			7	.223	.018	300.437	.188	.258
			8	.229	.018	300.437	.195	.264
			9	.224	.018	300.437	.189	.259
			10	.207	.018	323.077	.172	.243
		Dominant	1	.248	.018	300.437	.214	.283
			2	.208	.018	300.437	.173	.242
			3	.188	.018	300.437	.153	.222
			4	.235	.018	300.437	.200	.269
			5	.201	.018	300.437	.166	.235
			6	.194	.018	300.437	.160	.229

		7	.208	.018	300.437	.173	.243
		8	.194	.018	300.437	.160	.229
		9	.221	.018	300.437	.187	.256
		10	.221	.018	323.077	.186	.256
Bimanual	Non-dominant	1	.238	.018	323.084	.203	.273
		2	.234	.018	300.437	.199	.268
		3	.209	.018	323.084	.174	.245
		4	.204	.018	323.091	.168	.239
		5	.196	.018	300.437	.161	.231
		6	.212	.018	300.437	.178	.247
		7	.195	.018	323.084	.160	.231
		8	.184	.018	300.437	.150	.219
		9	.209	.018	323.091	.174	.244
		10	.192	.018	300.437	.157	.227
	Dominant	1	.245	.018	323.084	.210	.281
		2	.245	.018	300.437	.210	.280
		3	.209	.018	323.084	.173	.244
		4	.214	.018	323.091	.178	.249
		5	.188	.018	300.437	.154	.223
		6	.195	.018	300.437	.161	.230

			7	.198	.018	323.084	.162	.233
			8	.197	.018	300.437	.162	.232
			9	.216	.018	323.091	.181	.252
			10	.198	.018	300.437	.164	.233
Important	Unimanual	Non-dominant	1	.236	.018	300.437	.200	.271
			2	.206	.018	300.437	.171	.242
			3	.198	.018	300.437	.162	.233
			4	.198	.019	324.606	.162	.235
			5	.191	.019	324.591	.155	.228
			6	.188	.018	300.437	.153	.224
			7	.198	.018	300.437	.162	.233
			8	.202	.018	300.437	.166	.238
			9	.192	.018	300.437	.156	.228
			10	.166	.019	324.606	.129	.202
		Dominant	1	.230	.018	300.437	.194	.265
			2	.224	.019	324.606	.187	.260
			3	.187	.018	300.437	.151	.223
			4	.198	.018	300.437	.163	.234
			5	.178	.018	300.437	.142	.213
			6	.179	.018	300.437	.143	.215

			7	.191	.018	300.437	.155	.226
			8	.192	.018	300.437	.156	.227
			9	.215	.018	300.437	.179	.251
			10	.219	.018	300.437	.183	.254
	Bimanual	Non-dominant	1	.218	.018	300.437	.183	.254
			2	.224	.020	384.406	.186	.263
			3	.186	.018	300.437	.150	.222
			4	.193	.018	300.437	.157	.228
			5	.178	.018	300.437	.142	.213
			6	.198	.018	300.437	.163	.234
			7	.181	.018	300.437	.145	.217
			8	.222	.019	352.381	.185	.260
			9	.187	.019	324.631	.151	.224
			10	.192	.019	324.631	.156	.229
		Dominant	1	.225	.018	300.437	.189	.260
			2	.228	.020	384.406	.190	.267
			3	.189	.018	300.437	.153	.225
			4	.197	.018	300.437	.161	.232
			5	.183	.018	300.437	.147	.219
			6	.203	.018	300.437	.168	.239

	7	.185	.018	300.437	.149	.220
	8	.228	.019	352.381	.190	.265
	9	.193	.019	324.631	.157	.230
	10	.197	.019	324.631	.161	.234

Appendix F

Force Task analyses: Rise time

Table F1

Summary of fixed effects and interactions for rise time

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	30.998	1254.074	.000
Group	1	30.998	.488	.490
Condition	1	1176.267	2.592	.108
Hand	1	1176.033	.622	.430
Trial	9	1176.249	.389	.941
Group * Condition	1	1176.267	.654	.419
Group * Hand	1	1176.033	.526	.468
Group * Trial	9	1176.249	1.880	.051
Condition * Hand	1	1176.033	8.865	.003
Condition * Trial	9	1176.227	.890	.533
Hand * Trial	9	1176.034	.927	.501
Group * Condition * Hand	1	1176.033	.489	.484
Group * Condition * Trial	9	1176.227	1.017	.424
Group * Hand * Trial	9	1176.034	.460	.901
Condition * Hand * Trial	9	1176.034	.695	.714
Group * Condition * Hand * Trial	9	1176.034	.815	.603

Table F2

Rise time differed little between Important and Trivial groups.

Group	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Trivial	.328	.013	30.975	.302	.354
Important	.316	.013	31.021	.289	.342

Table F3

There was little difference between unimanual and bimanual rise time.

Condition	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Unimanual	.318	.009	35.897	.299	.337
Bimanual	.326	.009	36.189	.307	.345

Table F4

There was little difference between dominant and non-dominant rise time.

Hand	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
Non-dominant	.324	.009	36.081	.305	.343
Dominant	.320	.009	35.995	.301	.339

Table F5

There was little difference between trials for rise time.

Trial	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
1	.322	.012	89.239	.298	.346
2	.320	.012	92.891	.296	.344
3	.321	.012	87.977	.298	.345
4	.316	.012	88.651	.292	.339
5	.323	.012	87.440	.299	.346
6	.319	.012	86.772	.295	.342
7	.323	.012	87.977	.299	.346
8	.334	.012	89.716	.311	.358
9	.323	.012	89.358	.300	.347
10	.318	.012	90.004	.294	.341

Table F6

The pairwise comparisons for the non-significant effect of trial

Trials compared		Mean Difference	Std. Error	df	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
1	2	.002	.012	1176.523	.865	-.021	.025
	3	.001	.011	1176.194	.927	-.021	.023
	4	.006	.011	1176.219	.582	-.016	.029
	5	-.001	.011	1176.121	.948	-.023	.021
	6	.003	.011	1176.101	.769	-.019	.026
	7	-.001	.011	1176.194	.941	-.023	.021
	8	-.012	.011	1176.294	.283	-.035	.010
	9	-.001	.011	1176.210	.916	-.024	.021
	10	.005	.011	1176.264	.690	-.018	.027
2	3	-.001	.011	1176.494	.936	-.023	.022
	4	.004	.012	1176.356	.709	-.018	.027
	5	-.003	.011	1176.461	.814	-.025	.020
	6	.001	.011	1176.421	.905	-.021	.024
	7	-.003	.011	1176.494	.807	-.025	.020
	8	-.014	.012	1176.715	.219	-.037	.008
	9	-.003	.012	1176.650	.784	-.026	.019
	10	.003	.012	1176.537	.823	-.020	.025
3	4	.005	.011	1176.181	.645	-.017	.027
	5	-.002	.011	1176.093	.874	-.024	.020
	6	.002	.011	1176.073	.840	-.020	.024
	7	-.002	.011	1176.156	.867	-.024	.020
	8	-.013	.011	1176.268	.242	-.036	.009
	9	-.002	.011	1176.260	.843	-.025	.020
	10	.004	.011	1176.228	.758	-.019	.026

4	5	-.007	.011	1176.121	.536	-.029	.015
	6	-.003	.011	1176.098	.795	-.025	.019
	7	-.007	.011	1176.181	.531	-.029	.015
	8	-.019	.011	1176.307	.104	-.041	.004
	9	-.007	.011	1176.293	.512	-.030	.015
	10	-.002	.011	1176.263	.881	-.024	.021
5	6	.004	.011	1176.019	.718	-.018	.026
	7	.000	.011	1176.093	.993	-.022	.022
	8	-.012	.011	1176.229	.311	-.034	.011
	9	.000	.011	1176.204	.968	-.023	.022
	10	.005	.011	1176.176	.641	-.017	.028
6	7	-.004	.011	1176.073	.711	-.026	.018
	8	-.016	.011	1176.197	.169	-.038	.007
	9	-.005	.011	1176.178	.690	-.027	.018
	10	.001	.011	1176.147	.914	-.021	.023
7	8	-.011	.011	1176.268	.316	-.034	.011
	9	.000	.011	1176.260	.975	-.023	.022
	10	.005	.011	1176.228	.635	-.017	.028
8	9	.011	.011	1176.168	.333	-.011	.033
	10	.017	.011	1176.153	.142	-.006	.039
9	10	.006	.011	1176.138	.615	-.017	.028

Table F7

Unimanual and bimanual rise time did not differ greatly between Trivial and Important groups.

Group	Condition	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Unimanual	.322	.013	35.912	.295	.349
	Bimanual	.334	.013	36.074	.308	.361
Important	Unimanual	.313	.014	35.884	.286	.341
	Bimanual	.318	.014	36.298	.290	.345

Table F8

The rise time for dominant and non-dominant hands did not differ greatly between Important and Trivial groups.

Group	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	Non-dominant	.328	.013	36.042	.302	.355
	Dominant	.328	.013	35.939	.301	.355
Important	Non-dominant	.319	.014	36.118	.292	.347
	Dominant	.312	.014	36.048	.284	.339

Table F9

There are some sizeable differences between groups for each trial, where the rise time of some trials for the Trivial group is higher those for the Important group.

Group	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Trivial	1	.314	.017	91.892	.281	.347
	2	.322	.016	87.991	.290	.355
	3	.321	.017	89.266	.288	.354
	4	.321	.017	89.268	.288	.354
	5	.326	.016	86.772	.293	.358
	6	.334	.016	86.772	.301	.366
	7	.354	.017	89.266	.321	.387
	8	.346	.016	86.772	.313	.379
	9	.330	.017	89.268	.297	.363
	10	.315	.017	89.212	.282	.348
Important	1	.330	.017	86.772	.297	.364
	2	.318	.017	97.603	.283	.353
	3	.321	.017	86.772	.287	.355
	4	.311	.017	88.072	.277	.345
	5	.320	.017	88.071	.286	.354
	6	.304	.017	86.772	.270	.338
	7	.292	.017	86.772	.258	.325
	8	.323	.017	92.526	.288	.357
	9	.317	.017	89.442	.283	.351
	10	.320	.017	90.751	.286	.354

Table F10

The rise time for the dominant hand differed between unimanual and bimanual conditions, whereas the non-dominant hand showed little change.

Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	Non-dominant	.327	.010	47.087	.307	.348
	Dominant	.308	.010	46.704	.288	.328
Bimanual	Non-dominant	.320	.010	47.531	.300	.341
	Dominant	.332	.010	47.531	.311	.352

Table F11

There was little difference across trial between unimanual and bimanual conditions.

Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Unimanual	1	.326	.014	182.273	.297	.354
	2	.316	.014	182.275	.287	.344
	3	.319	.014	175.661	.291	.347
	4	.301	.014	179.165	.273	.330
	5	.320	.014	179.163	.292	.348
	6	.329	.014	175.661	.301	.357
	7	.317	.014	175.661	.289	.345
	8	.326	.014	175.661	.298	.354
	9	.309	.014	175.661	.281	.337
	10	.315	.014	185.390	.287	.344
Bimanual	1	.319	.014	181.974	.290	.347
	2	.325	.015	200.809	.296	.354
	3	.323	.014	181.974	.294	.351
	4	.330	.014	181.978	.302	.359
	5	.325	.014	175.661	.297	.354
	6	.309	.014	175.661	.281	.337
	7	.329	.014	181.974	.301	.357
	8	.343	.015	191.126	.314	.372
	9	.338	.015	189.231	.309	.366
	10	.320	.014	182.840	.291	.348

Table F12

There was little differences between non-dominant and dominant hands across trials.

Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
Non-dominant	1	.320	.014	185.382	.292	.349
	2	.311	.015	191.035	.283	.340
	3	.322	.014	178.751	.294	.350
	4	.319	.014	182.275	.290	.347
	5	.329	.014	179.163	.301	.358
	6	.325	.014	175.661	.297	.353
	7	.312	.014	178.751	.284	.340
	8	.350	.014	183.199	.322	.378
	9	.329	.014	182.279	.301	.358
	10	.321	.014	185.811	.292	.349
Dominant	1	.324	.014	178.751	.296	.352
	2	.329	.015	191.592	.300	.358
	3	.320	.014	178.751	.292	.349
	4	.313	.014	178.752	.285	.341
	5	.316	.014	175.661	.288	.344
	6	.312	.014	175.661	.284	.340
	7	.334	.014	178.751	.306	.362
	8	.319	.014	183.199	.290	.347
	9	.317	.014	182.279	.289	.346
	10	.314	.014	182.277	.286	.343

Table F13

There was little difference in rise time between trivial and important groups, across unimanual and bimanual conditions for dominant and non-dominant hands.

Group	Condition	Hand	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	.332	.014	47.158	.303	.360
		Dominant	.313	.014	46.699	.284	.341
	Bimanual	Non-dominant	.325	.014	47.284	.297	.354
		Dominant	.344	.014	47.284	.315	.372
Important	Unimanual	Non-dominant	.323	.014	47.021	.294	.352
		Dominant	.304	.014	46.709	.275	.333
	Bimanual	Non-dominant	.316	.015	47.765	.286	.345
		Dominant	.320	.015	47.765	.290	.349

Table F14

The effect of group had little impact on differences between unimanual and bimanual conditions across trial.

Group	Condition	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Unimanual	1	.311	.020	189.379	.272	.351
		2	.318	.020	182.054	.279	.358
		3	.315	.020	175.661	.276	.354
		4	.294	.020	175.661	.255	.333
		5	.324	.020	175.661	.285	.363
		6	.356	.020	175.661	.317	.395
		7	.333	.020	175.661	.294	.372
		8	.342	.020	175.661	.303	.381
		9	.313	.020	175.661	.274	.352
		10	.315	.020	188.494	.275	.355
	Bimanual	1	.317	.020	188.753	.277	.356
		2	.326	.020	175.661	.287	.365
		3	.328	.020	188.753	.288	.367
		4	.347	.020	188.762	.307	.387
		5	.327	.020	175.661	.288	.366
		6	.312	.020	175.661	.273	.351
		7	.376	.020	188.753	.336	.416
		8	.350	.020	175.661	.311	.389
		9	.347	.020	188.762	.307	.387
		10	.314	.020	175.661	.275	.353
Important	Unimanual	1	.340	.020	175.661	.300	.380
		2	.313	.021	182.483	.272	.353
		3	.324	.020	175.661	.284	.364
		4	.309	.021	182.483	.268	.349

	5	.316	.021	182.479	.276	.357
	6	.302	.020	175.661	.262	.343
	7	.301	.020	175.661	.261	.342
	8	.309	.020	175.661	.269	.350
	9	.305	.020	175.661	.265	.345
	10	.316	.021	182.483	.275	.356
Bimanual	1	.321	.020	175.661	.280	.361
	2	.323	.022	225.286	.280	.366
	3	.318	.020	175.661	.278	.358
	4	.313	.020	175.661	.273	.354
	5	.324	.020	175.661	.284	.364
	6	.305	.020	175.661	.265	.346
	7	.282	.020	175.661	.242	.322
	8	.336	.021	206.013	.294	.378
	9	.328	.021	189.674	.287	.369
	10	.325	.021	189.674	.284	.366

Table F15

Group had little effect on the rise time of dominant and non-dominant hands across trials.

Group	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Trivial	Non-dominant	1	.309	.020	195.881	.269	.349
		2	.301	.020	182.054	.261	.340
		3	.316	.020	182.052	.277	.356
		4	.320	.020	182.054	.281	.360
		5	.327	.020	175.661	.288	.366
		6	.343	.020	175.661	.304	.382
		7	.343	.020	182.052	.303	.382
		8	.367	.020	175.661	.328	.406
		9	.336	.020	182.054	.296	.375
		10	.323	.020	182.050	.284	.363
	Dominant	1	.319	.020	182.052	.280	.359
		2	.344	.020	175.661	.305	.383
		3	.326	.020	182.052	.286	.365
		4	.321	.020	182.054	.282	.361
		5	.325	.020	175.661	.286	.364
		6	.325	.020	175.661	.286	.364
		7	.366	.020	182.052	.326	.405
		8	.325	.020	175.661	.286	.364
		9	.324	.020	182.054	.285	.364
		10	.306	.020	182.050	.267	.346
Important	Non-dominant	1	.332	.020	175.661	.291	.372
		2	.322	.021	199.601	.280	.364
		3	.327	.020	175.661	.287	.367
		4	.317	.021	182.483	.277	.358

	5	.332	.021	182.479	.292	.373
	6	.308	.020	175.661	.268	.348
	7	.281	.020	175.661	.241	.322
	8	.333	.021	190.380	.292	.374
	9	.323	.021	182.490	.283	.364
	10	.318	.021	189.371	.277	.359
Dominant	1	.329	.020	175.661	.288	.369
	2	.314	.021	206.942	.272	.356
	3	.315	.020	175.661	.275	.355
	4	.305	.020	175.661	.264	.345
	5	.308	.020	175.661	.267	.348
	6	.300	.020	175.661	.260	.340
	7	.302	.020	175.661	.262	.342
	8	.312	.021	190.380	.271	.353
	9	.310	.021	182.490	.270	.351
	10	.323	.021	182.490	.282	.363

Table F16

Condition had little effect on the rise time of dominant and non-dominant hands across trials.

Condition	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
						Lower Bound	Upper Bound
Unimanual	Non-dominant	1	.324	.019	425.971	.287	.360
		2	.308	.018	410.197	.272	.344
		3	.321	.018	396.210	.285	.356
		4	.313	.018	412.058	.277	.349
		5	.339	.018	412.053	.303	.375
		6	.358	.018	396.210	.322	.393
		7	.315	.018	396.210	.279	.351
		8	.346	.018	396.210	.311	.382
		9	.325	.018	396.210	.290	.361
		10	.325	.019	425.972	.288	.361
	Dominant	1	.328	.018	396.210	.292	.363
		2	.323	.018	412.058	.287	.359
		3	.318	.018	396.210	.282	.353
		4	.290	.018	396.210	.254	.325
		5	.301	.018	396.210	.265	.337
		6	.300	.018	396.210	.265	.336
		7	.319	.018	396.210	.283	.355
		8	.305	.018	396.210	.269	.340
		9	.293	.018	396.210	.257	.328
		10	.306	.018	410.193	.270	.342
Bimanual	Non-dominant	1	.317	.018	410.195	.281	.353
		2	.315	.019	450.691	.278	.352
		3	.323	.018	410.195	.287	.359
		4	.324	.018	410.197	.288	.360

	5	.320	.018	396.210	.284	.355
	6	.293	.018	396.210	.257	.329
	7	.309	.018	410.195	.273	.345
	8	.354	.019	430.076	.317	.390
	9	.334	.019	425.983	.297	.370
	10	.317	.018	412.066	.281	.353
Dominant	1	.320	.018	410.195	.284	.356
	2	.335	.019	450.691	.298	.372
	3	.323	.018	410.195	.287	.359
	4	.336	.018	410.197	.300	.372
	5	.331	.018	396.210	.296	.367
	6	.324	.018	396.210	.289	.360
	7	.349	.018	410.195	.313	.385
	8	.333	.019	430.076	.296	.369
	9	.342	.019	425.983	.305	.378
	10	.323	.018	412.066	.287	.359

Table F17

Group assignment had little impact on between condition, between hands and across trials.

Group	Condition	Hand	Trial	Mean	Std. Error	df	95% Confidence Interval	
							Lower Bound	Upper Bound
Trivial	Unimanual	Non-dominant	1	.310	.027	457.220	.258	.362
			2	.291	.026	424.992	.240	.342
			3	.309	.025	396.210	.259	.359
			4	.299	.025	396.210	.249	.348
			5	.347	.025	396.210	.297	.396
			6	.392	.025	396.210	.342	.441
			7	.342	.025	396.210	.293	.392
			8	.367	.025	396.210	.317	.416
			9	.320	.025	396.210	.271	.370
			10	.340	.026	424.983	.289	.391
		Dominant	1	.313	.025	396.210	.264	.363
			2	.346	.025	396.210	.296	.396
			3	.320	.025	396.210	.271	.370

		4	.290	.025	396.210	.240	.339
		5	.302	.025	396.210	.252	.351
		6	.319	.025	396.210	.270	.369
		7	.323	.025	396.210	.274	.373
		8	.317	.025	396.210	.267	.367
		9	.305	.025	396.210	.256	.355
		10	.291	.026	424.983	.240	.341
Bimanual	Non-dominant	1	.308	.026	424.988	.257	.359
		2	.311	.025	396.210	.261	.360
		3	.324	.026	424.988	.273	.375
		4	.342	.026	424.992	.291	.393
		5	.306	.025	396.210	.257	.356
		6	.293	.025	396.210	.244	.343
		7	.344	.026	424.988	.293	.394
		8	.367	.025	396.210	.317	.417
		9	.351	.026	424.992	.300	.402
		10	.306	.025	396.210	.257	.356

		Dominant	1	.325	.026	424.988	.274	.376
			2	.342	.025	396.210	.292	.391
			3	.331	.026	424.988	.281	.382
			4	.353	.026	424.992	.302	.404
			5	.348	.025	396.210	.298	.397
			6	.330	.025	396.210	.280	.380
			7	.408	.026	424.988	.357	.459
			8	.334	.025	396.210	.284	.383
			9	.343	.026	424.992	.292	.394
			10	.322	.025	396.210	.273	.372
Important	Unimanual	Non-dominant	1	.338	.026	396.210	.287	.389
			2	.325	.026	396.210	.274	.376
			3	.333	.026	396.210	.282	.384
			4	.328	.027	426.901	.275	.380
			5	.332	.027	426.892	.280	.384
			6	.323	.026	396.210	.272	.374
			7	.288	.026	396.210	.237	.339

		8	.326	.026	396.210	.275	.377
		9	.330	.026	396.210	.279	.381
		10	.310	.027	426.901	.257	.362
	Dominant	1	.342	.026	396.210	.291	.393
		2	.300	.027	426.901	.248	.353
		3	.315	.026	396.210	.264	.366
		4	.289	.026	396.210	.238	.341
		5	.301	.026	396.210	.249	.352
		6	.281	.026	396.210	.230	.332
		7	.315	.026	396.210	.264	.366
		8	.293	.026	396.210	.242	.344
		9	.280	.026	396.210	.229	.331
		10	.322	.026	396.210	.271	.373
Bimanual	Non-dominant	1	.326	.026	396.210	.275	.377
		2	.319	.028	500.643	.263	.374
		3	.321	.026	396.210	.270	.372
		4	.307	.026	396.210	.256	.358

		5	.333	.026	396.210	.282	.384
		6	.293	.026	396.210	.241	.344
		7	.275	.026	396.210	.224	.326
		8	.340	.027	461.530	.286	.394
		9	.316	.027	426.915	.264	.369
		10	.327	.027	426.915	.274	.379
	Dominant	1	.315	.026	396.210	.264	.366
		2	.328	.028	500.643	.272	.383
		3	.315	.026	396.210	.264	.366
		4	.320	.026	396.210	.269	.371
		5	.315	.026	396.210	.264	.366
		6	.318	.026	396.210	.267	.369
		7	.289	.026	396.210	.238	.340
		8	.332	.027	461.530	.278	.386
		9	.340	.027	426.915	.288	.393
		10	.323	.027	426.915	.271	.376